

A TAXONOMIC REVISION OF *CYNANCHUM* L. (ASCLEPIADACEAE: ASCLEPIADOIDEAE) IN AUSTRALIA

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Summary

A taxonomic revision of the genus *Cynanchum* L. in Australia is provided and 11 species are recognised. A key to distinguish them is provided. Lectotypes are selected for six names.

Introduction

The genus *Cynanchum* was first described by Linnaeus (1753), based on five species. It is therefore one of the few genera in the Asclepiadaceae to be recognised as distinct from *Asclepias* L. at that time. Robert Brown (1810b, 1811) maintained *Cynanchum* and defined the genus by default in transferring most of the species included by Linnaeus to various new genera. Brown (1810a) added a number of species to the genus including two from Australia, namely *C. pedunculatum* R. Br. and *C. floribundum* R. Br. *Cynanchum* is most closely allied to *Sarcostemma* R. Br., and the two genera traditionally have been distinguished by the former having an inner staminal corona of five distinct or basally connate, often conduplicate, but not vesicular segments and lacking an outer corona, whereas the latter has an inner staminal corona of five distinct vesicular segments and an outer laminate corona (Woodson 1941; Rosatti 1989). Many taxa of *Cynanchum* are also characterised by the distinctive pendulous pollinia that are elliptic in outline with rounded ends and attached to short, straight, often somewhat thickened caudicles. In comparison, taxa of *Sarcostemma* usually have pendulous pollinia that are obovate-elliptic, always much wider at the end furthest from the caudicle and attached to long, often curved caudicles.

A great many genera of Asclepiadaceae since described can now be considered as being congeneric with the pantropic *Cynanchum*. Many of the generic names, especially those applying to neotropical plants, were placed in synonymy with *Cynanchum* by Woodson (1941) and this has been supported by a number of more recent workers (Spellman 1975; Sundell 1981; Henrickson 1987; Rosatti 1989). A number of genera described from Madagascar were also placed in *Cynanchum* by Descoings (1961).

The last treatment of *Cynanchum* in Australia was by Bentham (1869) who recognised both *Cynanchum* and *Vincetoxicum*, with four species in each genus. In New Guinea, Warburg (1891) described *Vincetoxicum discolor* and Schlechter (1914) mentioned the provisional name *Cynanchum neopommeranicum*. A number of authors have included *C. carnosum* (R. Br.) Schltr. as *Ischnostemma carnosum* or under other names (Forster 1988). Kuntze (1891) chose to place various Australian species belonging to *Tylophora* in the genus *Vincetoxicum*, but his account is confused and based on erroneous generic concepts. Domin (1928) did not regard *Vincetoxicum* as distinct from *Cynanchum* and made new combinations under the latter for most of the taxa described as new in the former by Bentham (1869). More recently, several apparently restricted taxa of *Cynanchum* have been described by Forster (1989) and Forster and Thongpukdee (1988).

Vincetoxicum Wolf has been often recognised as distinct from *Cynanchum*. The most recent proponents of *Vincetoxicum* as a distinct genus are Ali and Khartoon (1982) and Ali (1983). However, their arguments for recognising the genus as distinct are based on relatively trivial differences of the staminal corona. At most, *Vincetoxicum* should be accorded sectional status in *Cynanchum* (as section *Vincetoxicum* (Wolf) Tsiang & Li) (Tsiang & Li 1974), but until a monograph of the genus is undertaken, any infrageneric classification proposed would be premature in its taxonomic arrangements. As noted by Sundell (1981), any infrageneric classification will need to account for the precise placement of the lectotype of *Cynanchum*, *C. acutum* L., before the various infrageneric groups can be accorded their correct taxonomic status.

The name *Vincetoxicum* has been attributed to several authors (e.g. in Bentham (1869) it is given as Moench.). However, Bullock (1958) first incorrectly and then (1967) correctly indicated both the correct author and the earliest date of publication.

My brief has been to revise the genus as it occurs in Australia as a precursor to a 'Flora of Australia' treatment, and this paper concentrates primarily on a taxonomic account of the species from this region. Hence, it has not been possible, given the time and resources available, to adequately deal with the many problems concerning both the generic and infrageneric classification of *Cynanchum s. lat.* worldwide. Therefore, I have chosen to recognise a broadly defined *Cynanchum*, thus taking into account a diverse assemblage of vines, herbs and succulent shrubs (cf. Descoings 1961; Spellman 1975; Sundell 1981; Rosatti 1989). Considerable floral variation is present in these taxa with respect to the shape and degree of lobing of the staminal corona. This floral variation may be viewed as representing various degrees of specialization with respect to different pollinators. However, at this stage there is no available information on the pollinators of species of *Cynanchum* in Australia, or elsewhere for that matter.

Despite the lack of a satisfactory world-wide infrageneric classification of *Cynanchum*, it is possible to allocate the Australian taxa into a number of groups. These groups can be defined on habit and floral characters, particularly the form of the staminal corona.

Group 1. Erect seasonally deciduous herbs; staminal corona of 5 simple lobes. *C. brachystelmoides*, *C. christineae* and *C. liebiana*.

Group 2. Evergreen lianes; staminal corona of 5 simple lobes. *C. bowmanii*, *C. carnosum*, *C. elegans* and *C. leptolepis*.

Group 3. Evergreen or seasonally deciduous lianes; staminal corona consisting of 5 connate lobes forming a tube around the base of the staminal column and usually divided into as many as 25 variously shaped lobes. *C. floribundum*, *C. ovalifolium*, *C. pedunculatum* and *C. puberulum*.

If a sectional classification is applied to these groups, then Groups 1 and 2 belong to the section *Vincetoxicum*, whereas Group 3 belongs to section *Cynoctum* (E. Meyer) Schumann. The section *Cynoctum* would appear equivalent to the subgenus *Mellichampia* (A. Gray ex S. Wats.) Woods. as defined by Sundell (1981).

Species of **Group 1** are closely allied to a number of taxa from Asia, particularly the Chinese *C. riparium* Tsiang & Zhang and *C. hydrophilum* Tsiang & Zhang. An unusual characteristic of this group is the ability of two species, namely *C. brachystelmoides* and *C. liebiana*, to tolerate seasonal flooding. Both these species have stems that are hollow, except for one or two internodes below the growing apex, one or two internodes above the rootstock, and the nodes themselves. This is a most unusual feature for an asclepiad and presumably parallels the hollow or air-ducted stems found in many strictly aquatic plants (Arber 1920; Sculthorpe 1967). These hollow or air-ducted stems with minimal xylem development represent adaptations to the problem of transporting air to the root systems that are often situated in low-oxygen or strictly anaerobic situations, while still maintaining transpirational flow (Zimmerman 1983).

Species of **Group 2** such as *C. bowmanii* and *C. elegans* are similar to a number of taxa from the Indian subcontinent (Hooker 1885; Ali & Khartoon 1982), but the endemic Australian taxa appear more closely related to one another than to any species from elsewhere. The distribution of *C. ovalifolium* from India to Australia is quite remarkable. However, this species is easily recognised, by the distinctive stipular outgrowths at the nodes.

The flowers of species of **Group 3** are superficially similar to a number of succulent-stemmed taxa from Madagascar such as *C. macrolobum* Jum. & Perr. and *C. mahafalense* Jum. & Perr. (Descoings 1961) and to a number of the species discussed by Sundell (1981). However, the Australian taxa are radically different in vegetative form from these species, and, with the exception of the somewhat shrubby *C. floribundum*, are all seasonally renescent. Without comparative studies of other leafy taxa of the genus from Asia, I am reluctant to suggest relationships, although *C. pedunculatum* and *C. puberulum* appear to be closely allied to each other.

Materials and Methods

Floral descriptions are based on spirit or reconstituted dried material. Foliage and fruit descriptions are based on herbarium material. Indumentum cover is described as defined by Hewson (1988), except that the term 'scattered' is used instead of 'isolated'. Herbarium holdings at AD, BRI, CANB, CBG, DNA, JCT, MEL, NE, PERTH and QRS, partial holdings at A, L and NSW and photographs or microfiche of relevant type material at BM, K, G and P were examined. Material was collected or procured in Australia between 1981 and 1990. In selecting specimens to cite, preference has been given to fertile, widely duplicated collections or those that indicate the geographic range of the taxon concerned. Generic synonymy is restricted to those names applicable to Australian taxa. More comprehensive generic synonymies may be found in Woodson (1941), Descoings (1961), Sundell (1981) and Rosatti (1989).

Taxonomic Treatment

Cynanchum L., Sp. Pl. 212 (1753). **Type:** *Cynanchum acutum* L.

L., Gen. Pl. ed. 5, 101 (1754); R. Br., Prodr. 462-463 (1810); Mem. Wern. Nat. Hist. Soc. 1: 43-48 (1811); Wight, Contrib. bot. India 55-59 (1834); G. Don., Gen. Syst. 4: 150 (1837); Decne. in DC., Prodr. 8: 547-552 (1844); Benth., Fl. austral. 4: 331-333 (1869); Benth. in Benth. & J.D. Hook., Gen. Pl. 2: 762-763 (1876); J.D. Hook., Fl. Brit. India 4: 21-26 (1885); Schumann in Engl. & Prantl., Nat. Pflanzenfam. 4(2): 250-253 (1897); Bailey, Queensl. fl. 3: 1001-1002 (1900); Schltr., Bot. Jahrb. Syst. 50: 93 (1914); Tsiang, Sunyatsenia 4: 107-119 (1939); Woodson, Ann. Missouri Bot. Gard. 28: 208-216 (1941); Bakhuizen van den Brink, Blumea 6: 369-370 (1950); Descoings, Adansonia 1: 299-342 (1961); Backer & Bakhuizen van den Brink, Fl. Java 3: 252-253 (1965); Stearn, Phytologia 21: 137-138 (1971); Markgraf in Tutin *et al.*, Fl. Europ. 3: 71 (1972); Tsiang & Li, Acta Phytotaxon. Sin. 12: 83-112 (1974); Spellman, Ann. Missouri Bot. Gard. 62: 115-122 (1975); Hausner, Beitr. Biol. Pflanz. 52: 101-126 (1976); Sundell, Evol. Monog. 5: 1-63 (1981); Ali, Fl. Pakistan 150: 9-17 (1983); Huber, Rev. Fl. Ceylon 4: 79-81 (1983); Kanta *et al.*, Acta Phytotax. Geobot. 37: 59-68 (1986); Henrickson, Sida 12: 91-99 (1987); Forster, Austrobaileya 3: 110-114 (1989).

Derivation of Name: Greek, *kynos*, dog, and *ancho* to strangle, alluding to the supposed use of some European species for poisoning dogs or other vermin.

Vincetoxicum Wolf, Gen. Pl. 130 (1776). **Type:** *V. hircinaria* Medikus [= *Asclepias vincetoxicum* L.]

Wolf, Gen. Sp. 269 (1781); Medikus, Hist. Commentat. Acad. Elect. Sci. Theod.-Palat. 6: 404 (1790); Moench., Method. 717 (1794); Endl., Gen. 591 (1838); Decne. in DC, Prodr. 8: 523-526 (1844); Benth., Fl. austral. 4: 330-331 (1869); Benth. in Benth. & J.D. Hook., Gen. pl. 2: 761-762 (1876); Bailey, Queensl. fl. 3: 999-1001 (1900); Bullock, Kew Bull. 13: 302 (1958); Kew Bull. 21: 351 (1967); Rechinger f., Fl. Iran 73: 10 (1970); Markgraf, Bot. J. Linn. Soc. 64: 370-376 (1972); Markgraf in Tutin *et al.*, Fl. Europ. 3: 71 (1972); Vakili-Nejad, Rev. Gen. Bot. 84: 79-88 (1977); Ali & Khartoon, Pak. J. Bot. 14: 61-68 (1982); Ali, Fl. Pakistan 150: 31-38 (1983); non *Vincetoxicum* Walter, Fl. Carol. 13: 104 (1788).

Cynoctonum E. Mey., Comment. Africae 215 (1837). **Type:** not designated.

Endl., Gen. 591 (1831); Decne. in DC, Prodr. 8: 527-532 (1844); Miq., Fl. Ned. Ind. 2: 748 (1834). non J. F. Gmelin (1791).

Cyathella Decne., Ann. Sci. Nat. Bot. 2 ser. 9: 332, t. 12 (1838).

Substitute name for *Cynoctonum* E. Mey.

Herbs, subshrubs or vines, perennial, terrestrial or aquatic, with clear, white or yellow latex. Stems slender, woody or succulent, glabrous or with indumentum. Roots fibrous. Leaves opposite, flattened in cross-section, ovate, elliptic, linear, lanceolate, fleshy, coriaceous, herbaceous, sometimes scale-like; usually petiolate with small stipular structures at base; extrafloral nectaries present or absent at lamina base. Cymes appearing at nodes between the pair of leaves, sessile to pedunculate, umbelliform to racemiform, with 1-many fascicles. Sepals 5, distinct, generally with glands at base of lobes. Corolla deeply 5-lobed, rotate, campanulate or urceolate; lobes/petals valvate or variously imbricate. Staminal corona in the simplest form consisting of 5 lobes adnate to the base of

the staminal column, sometimes with extra lobing at or between the bases of these lobes; in the most complex form consisting of 5 connate lobes forming a tube around the base of the staminal column and usually divided into as many as 25 variously shaped lobes that may or may not overtop both the staminal column and the style-head. Stamens inserted at corolla-tube base, connate; anthers incurved, with incurved terminal appendages. Pollinaria each with 2 pollinia; pollinia smooth, pendulous, 2 in each anther cell, ellipsoid, ovoid or oblong, lacking pellucid margins; corpusculum oblong, tan to brown; caudicles flattened, often nearly as broad as long. Gynostegium flat-topped to umbonate with obtuse or capitate style-head; ovaries free or only the tip joined, glabrous. Follicles fusiform to ovoid, smooth or roughened; triangular to semi-terete in cross-section, single or more rarely paired. Seeds flat to boat-shaped, ovate, brown; comose with white hairs at micropylar end only, or lacking hairs.

Over 200 species worldwide. Eleven species in Australia.

Key to Australian species of *Cynanchum*

- | | |
|---|-------------------------------|
| 1. Plants twining | 2 |
| Plant generally erect, not twining | 9 |
| 2. Extrafloral nectaries absent from base of leaf lamina. | |
| NG,WA,NT,Q,NSW | 1. <i>C. carnosum</i> |
| Extrafloral nectaries present at base of leaf lamina | 3 |
| 3. Staminal corona of 5 separate lobes | 4 |
| Staminal corona comprising 5 outer lobes and 5 inner lobes, or appearing tubular with various appendages | 6 |
| 4. Leaves fleshy, ovate; corona lobes abruptly acuminate. | |
| NSW | 6. <i>C. elegans</i> |
| Leaves membranous, ovate, ovate-lanceolate or cordate-ovate; corona lobes not abruptly acuminate | 5 |
| 5. Leaves ovate, ovate-lanceolate or cordate-ovate; staminal corona lobes \pm same length as staminal column Q | 7. <i>C. bowmanii</i> |
| Leaves cordate-ovate; corona lobes more than twice as long as staminal column. NT,Q | 8. <i>C. leptolepis</i> |
| 6. Leaves glabrous, membranous. NG,Q | 9. <i>C. ovalifolium</i> |
| Leaves pubescent, rarely glabrous; coriaceous | 7 |
| 7. Sepals c. 1 mm long, follicles 25–30 mm long. WA,NT,Q,NSW, SA | 3. <i>C. floribundum</i> |
| Sepals 2–3 mm long, follicles 60–80 mm long | 8 |
| 8. Lobes of outer corona produced into long subulate points, foliage densely pubescent. NT,WA | 10. <i>C. puberulum</i> |
| Lobes of outer corona truncate, crenulate, shortly obtuse, denticulate or acuminate; foliage glabrous to sparsely pubescent. WA,NT, Q | 11. <i>C. pedunculatum</i> |
| 9. Staminal corona of 5 separate lobes | 10 |
| Staminal corona comprising 5 outer lobes and 5 inner lobes, or appearing tubular with various appendages | 11 |
| 10. Corolla purple; lobes lanceolate, 10–11 mm long. NT | 2. <i>C. liebiana</i> |
| Corolla cream; lobes lanceolate to ovate, 1.5–4.5 mm long. NG, NT,Q | 3. <i>C. brachystelmoides</i> |

11. Staminal corona appearing tubular with various appendages. WA, NT, Q,
NSW, SA 3. *C. floribundum*
Staminal corona comprising 5 outer lobes and 5 inner lobes.
NT 5. *C. christineae*

1. *Cynanchum carnosum* (R. Br.) Schltr. in Perkins, *Fragm. Flor. Philipp.* 120 (1904); *Oxystelma carnosum* R. Br., *Prodr.* 462 (1810); *Vincetoxicum carnosum* (R. Br.) Benth., *Fl. austral.* 4: 331 (1869); *Ischnostemma carnosum* (R. Br.) Merrill & Rolfe, *Phillip. J. Sci.* 3(3): 121 (1908); *Cynanchum carnosum* (R. Br.) Domin, *Biblioth. Bot.* 22 (89): 1085 (1928), *nom. superfl.* **Type:** Queensland. COOK DISTRICT: Island a [Sweer's Island, Gulf of Carpentaria], November 1802, *Brown* s.n. (lecto: BM, two sheets, *n.v.*, photo at BRI!).

Forster, *Austrobaileya* 2: 525–527 (1988); Wightman, *Mangroves of the Northern Territory* 57–59 (1989).

Ischnostemma selangorica King & Gamble, *J. Asiat. Soc. Bengal, Pt. 2 Nat. Hist.* 74: 532 (1907). **Type:** Selangor, at Kwala Selangor, *Ridley* 7564 (*n.v.*).

Pentatropis novoguineensis Val. ('*novo-guicensis*'), *Bull. Dep. Agric. Ind. Neerl.* 10: 49 (1907). **Type:** *Atasrip* 96 (*n.v.*).

van Steenis & Bakhuizen van den Brink, *Bot. Jahrb. Syst.* 86: 385–401 (1967).

Herbaceous vine, latex white. Stems cylindrical, up to 2 mm diameter, glabrous; internodes up to 9 cm long. Leaf petiolate; lamina fleshy, elliptic to obovate, up to 6.5 cm long and 2.5 cm wide, concolorous, grey-green to pale green; above glabrous, venation obscure; below glabrous, secondary veins 4–5 per side of midrib, glabrous; tip acuminate to apiculate; base cuneate to rounded; petiole grooved along top, up to 9 mm long and 2 mm wide, glabrous or with scattered indumentum; extrafloral nectaries absent from lamina base. Cymes umbelliform, up to 4 cm long, with 1–5 flowers; peduncle up to 3.2 cm long and c. 1 mm diameter, glabrous or with scattered indumentum; bracts lanceolate, 1.4–1.5 mm long, 0.75–0.9 mm wide, glabrous. Flowers subtotate, 2.5–5 mm long, 8–13 mm diameter; pedicels 7–17 mm long, 0.5–0.8 mm diameter, glabrous, light green with some brown splotches. Sepals lanceolate, 1.5–2.7 mm long, c. 1 mm wide, glabrous, light green, base of each sinus with 1 gland. Corolla greenish yellow to cream; tube 1.5–2 mm long, 2.5–3 mm diameter; lobes twisted to right in bud and at anthesis, lanceolate, 5–9 mm long, 1.8–2.5 mm wide, glabrous. Staminal corona comprising 5 free lobes, 2.3–3 mm long, c. 2 mm diameter, pale green to cream; each lobe oblong-rectangular at base and 0.8–1.25 mm wide, tapering to a subulate tip 0.1–0.3 mm wide. Staminal column 1.8–2.5 mm long, 1.25–1.8 mm wide; anther appendages triangular to lanceolate, 0.75–1 mm long, 0.4–0.8 mm wide; slit between anther wings 1–1.25 mm long. Style-head domed, not exceeding anther appendages, 0.6–0.9 mm long, 1–1.3 mm diameter, pale green. Ovaries c. 1.5 mm long, 0.75–1 mm wide. Pollinarium 0.5–0.57 mm long, 0.32–0.5 mm wide; pollinia oblong, 0.24–0.3 mm long, 0.11–0.13 mm wide; corpusculum oblong, 0.21–0.26 mm long, 0.09–0.14 mm wide; caudicles 0.11–0.15 mm long, 0.02–0.05 mm wide. Follicles fusiform, 7.3–7.5 cm long, 1.3–1.4 cm wide, glabrous. Seed ovate, 4–5 mm long, c. 3 mm wide; coma 15–20 mm long, white. **Fig. 1.**

For a discussion of the nomenclatural history of this species, a listing of selected specimens, and notes on phenology and conservation status, reference should be made to Forster (1988).

Distribution and habitat: *C. carnosum* is widespread in Australia (**Map 1**), New Guinea and parts of south-east Asia as a plant of the littoral zone where it usually grows just above the high-water mark often among rocks.

2. *Cynanchum liebiana* (F. Muell.) P. Forster, *Austrobaileya* 3: 110 (1989); *Tylophora liebiana* F. Muell., *J. Proc. Roy. Soc. New South Wales* 24: 78 (1891). **Type:** Northern Territory. Port Darwin, 1890, *M. Holtze* 1010 (holo: MEL!). **Fig. 4S–T.**

See Forster (1989) for a description and notes on distribution, habitat, phenology and conservation status.

Additional notes: R. Tingey, who was instrumental in the rediscovery of this plant, has shown photographs and drawings of it to a number of people. Some of these people claim to have seen this plant flowering in swamps in Arnhem Land and so it may be more widespread than the few herbarium specimens would indicate.

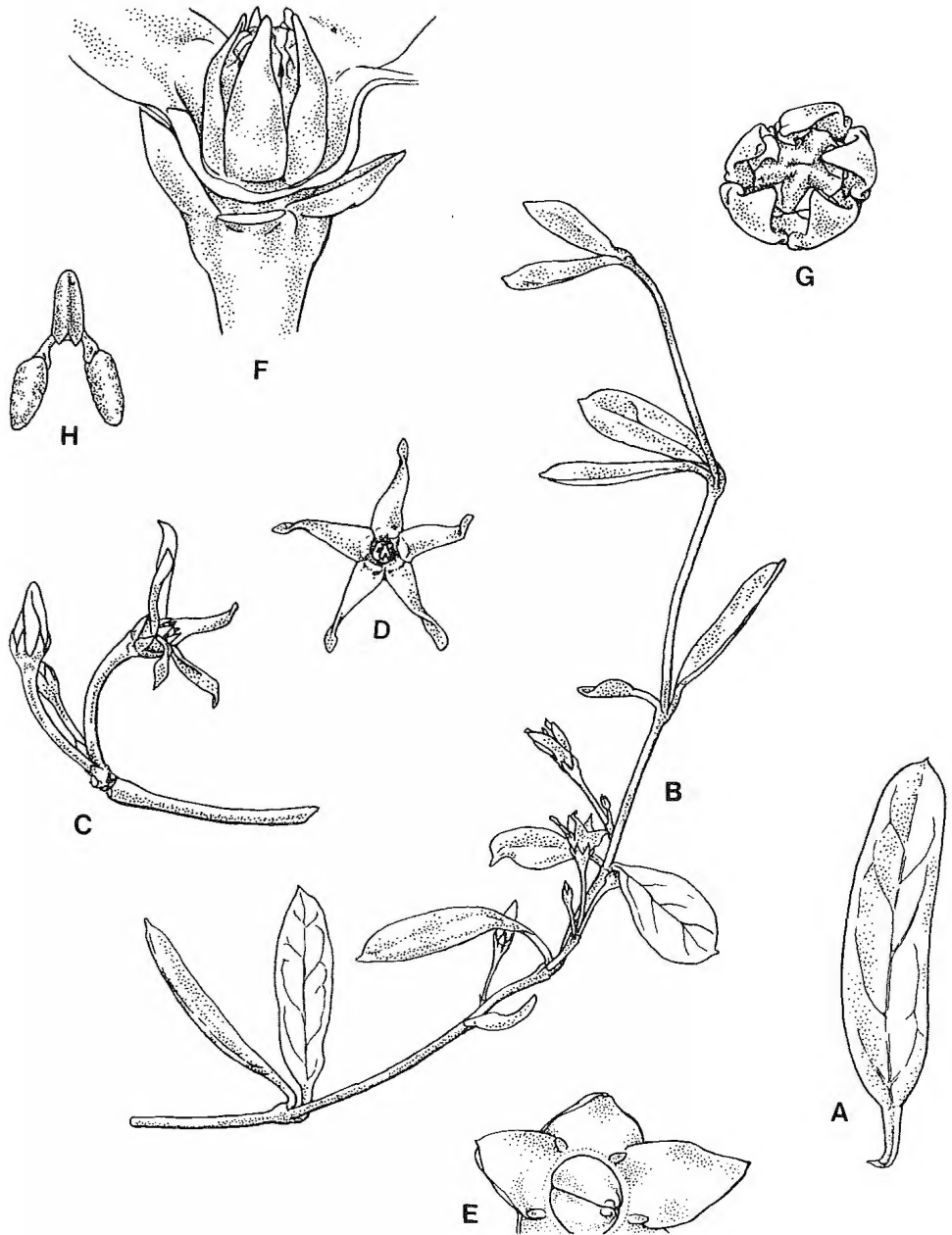


Fig. 1. *Cynanchum carnosum*: A. leaf $\times 1$. B. habit of flowering stem $\times 1$. C. inflorescence $\times 2$. D. face view of flower $\times 2$. E. face view of calyx and ovaries with corolla removed $\times 11$. F. side view of flower with corolla partly removed and showing staminal corona $\times 9$. G. face view of gynostegium $\times 9$. H. pollinarium $\times 40$. All from spirit material of Forster 3306. Del. K. Harold.

3. *Cynanchum floribundum* R. Br., Prodr. 463 (1810); *Cynoctonum floribundum* (R. Br.) Decne. in DC., Prodr. 8: 529 (1869); *Vincetoxicum floribundum* (R. Br.) O. Kuntze, Revis. gen. pl. 2: 424 (1891). **Type:** South Australia. Spencers Gulf [Bay 12, South Coast], 10 March 1802, *R. Brown* (lecto (here designated): BM, 2 sheets, *n.v.*, photo at BRI!; isolecto: CANB(CANB278884!)).
Benth., Fl. austral. 4: 332 (1869); Bailey, Queensl. fl. 3: 1001 (1900); W. Fitzg., Proc. Roy. Soc. Western Austral. 3: 196 (1928); K.L. Wilson, Fl. Central Austral. 278 (1981).

Erect shrub to 1 m high or somewhat sprawling, latex white. Stems cylindrical, up to 5 mm diameter, woody at base; internodes up to 12 cm long. Leaves petiolate; lamina lanceolate to lanceolate-ovate, up to 11.5 cm long and 45 mm wide, concolorous; above green, venation obscure, with scattered indumentum; below green, secondary veins 6 per side of midrib, with scattered to sparse indumentum; tip acute to acuminate; base cuneate to truncate; petiole up to 25 mm long and 0.5 mm wide, with scattered to sparse indumentum; extrafloral nectaries 2 at lamina base. Cymes with 1–4 fascicles, up to 4 cm long; peduncle up to 6 cm long, and c. 1 mm diameter, glabrous; bracts linear-lanceolate, 1–1.5 mm long, 0.25–0.75 mm wide, with sparse indumentum. Flowers rotate, 2.5–7 mm long, 8–10 mm diameter; pedicels 5–15 mm long, c. 1 mm diameter, with sparse indumentum. Sepals triangular to lanceolate-ovate, 1.8–3 mm long, 1–2 mm wide, ciliate, bases of sinuses with 1–3 glands. Corolla yellow to cream; tube 0.9–1 mm long, 1.6–4 mm diameter; lobes lanceolate, reflexed, 3.9–8 mm long, 1.6–3 mm wide, glabrous. Staminal corona yellow to cream, 1.6–7 mm long, 2–7 mm diameter, tubular with 10–15 irregular lobes; tube 1.5–2 mm long, lobes 4–5.7 mm long. Staminal column 1.5–3.5 mm long, 1.4–2.5 mm wide; anther appendages lanceolate to ovate-crenulate, 0.8–2 mm long, 0.6–1 mm wide, exceeding style-head by 0.4–1 mm; slit between anther wings 0.7–1.25 mm long. Style-head conical, 0.6–1 mm long, 0.9–1.5 mm diameter. Ovaries c. 1.5 mm long and 1 mm wide. Pollinarium 0.35–0.6 mm long, 0.6–0.9 mm wide; pollinia ovoid-globose, 0.2–0.4 mm long, 0.14–0.22 mm wide; corpusculum 0.23–0.35 mm long, 0.14–0.2 mm wide; caudicles 0.08–0.15 mm long, 0.04–0.12 mm wide. Follicle fusiform-ovoid, 3–6.5 cm long, 5–25 mm wide. Seed oblong-ovate, 7–8 mm long, 4 mm wide; coma white, 15–28 mm long. **Fig. 2.**

Selected specimens: Western Australia. Enderby Is, 20°36'S, 116°29'E, Jul 1980, *Kenneally* 7263 (CANB,PERTH); 9 km W of Shay Gap, 20°29'S, 120°06'E, Jul 1984, *Newbey* 10272 (PERTH); Crossing of Caroline Creek on road to Millstream, c. 25 km SW of Pyramid HS, 21°14'S, 117°19'E, Aug 1977, *Barker* 2108 (AD,MEL). Rudall River N.P., 22°32'S, 122°24'E, Apr 1979, *Mitchell* 881 (DNA,PERTH); Vampire Gorge, Hammersley Range, Aug 1959, *Gardner* 12277 (PERTH); Mt Herbert, 59 miles [98 km] from Roebourne on Wittenoom Road, Mar 1962, *George* 3507 (PERTH). Northern Territory. Stirling Creek, 21°40'S, 133°47'E, Aug 1985, *Leach & Smith* 697 (CANB,DNA,NSW); Old Redbank HS, "Narwietooma", 23°29'S, 132°50'E, Oct 1979, *Nelson* 2473 (BRI,DNA); 13 miles [22 km] NW "Napperby", *Chippendale* [NT2062] (DNA,MEL); c. 70 miles [117 km] WNW of Mt Singleton, Jun 1957, *Chippendale* [NT3348] (BRI,CANB,DNA,MEL). Queensland. BURKE DISTRICT: Spring Creek, 17 km N of Mt Isa, 20°32'S, 139°29'E, Feb 1985, *Harris* 39 (BRI). GREGORY NORTH DISTRICT: 6 km NW of "Makunda Downs", 22°21'S, 141°16'E, Jun 1979, *Purdie* 1545 (BRI); 21 km N of Diamantina Lakes Stn turnoff, Springvale – Diamantina Road, 23°42'S, 141°01'E, May 1977, *Schmid* 314 (BRI). New South Wales. Wild Dog Fence, Muncardie & Orka Gates, Feb 1980, *Barlow* [NSW191104] (NSW). South Australia. On Strzelecki Track, c. 134 km S of Moomba Gasfield, 29°09'S, 140°05'E, May 1977, *Lazarides* 8383 (BRI,CANB); Yanningurie Waterhole, 28°58'S, 140°06'E, Jul 1982, *Olsen* 176 (BRI); Lyndhurst-Innaminka Road, at Merti-Merti turnoff, 28°50'S, 140°10'E, Sep 1986, *Ballingall* 2262 (AD,BRI); 4.8 km N of Hawkers Gate on the border fence, 29°45'S, 141°00'E, May 1977, *Chinnock* 3505 (AD,MEL); Vicinity of Paralana Springs, 30°11'S, 139°27'E, Aug 1968, *Symon* 6018 (AD,CANB).

Distribution and habitat: This species is widespread over arid central Australia (Map 1) and is commonly found on sand ridges in association with *Zygochloa paradoxa* and *Triodia* species.

Phenology: Flowering after rain throughout the year. Fruiting occurs 2–3 months later.

Conservation status: Not rare or endangered.

4. *Cynanchum brachystelmoides* P. Forster, Austrobaileya 2: 451 (1988). **Type:** Queensland. COOK DISTRICT: 5 km W of the Watson River crossing on the Aurukun – Merluna road, c. 40 km NE of Aurukun, Dec 1981, *J.R. Clarkson* 4053 (holo: BRI!; iso: CANB!,DNA!,QRS!).

Herbaceous, erect perennial, latex lacking. Roots fusiform to 40 mm long. Stems upright, up to 35 cm long, 0.5–4.0 mm thick, with 3–5 branches, up to 10 nodes; internodes up to 5 cm long. Leaves linear, lacking extrafloral nectaries at base, 5–20 mm long, 0.25–

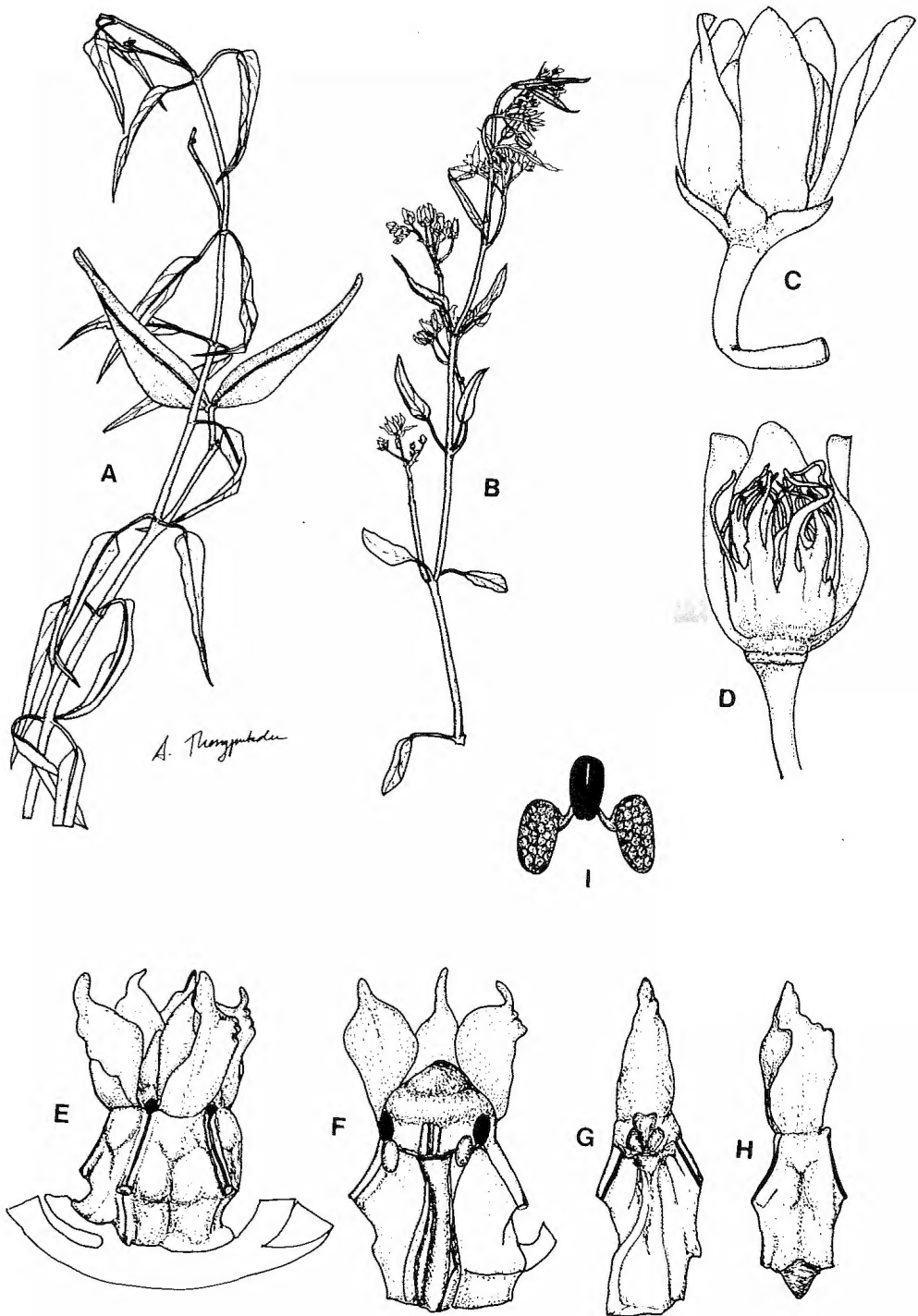


Fig. 2. *Cynanchum floribundum*: A. habit of fruiting branch $\times 0.25$. B. habit of flowering branch $\times 0.25$. C. side view of flower $\times 5$. D. side view of flower with corolla removed showing staminal corona $\times 5$. E. side view of staminal column with corolla and staminal corona removed $\times 10$. F. side view of staminal column with part removed showing the ovaries and disposition of the pollinaria $\times 10$. G. internal view of anther $\times 10$. H. external view of anther $\times 10$. I. pollinarium $\times 30$. All from spirit material of Olsen 176. Del. A. Thongpukdee.

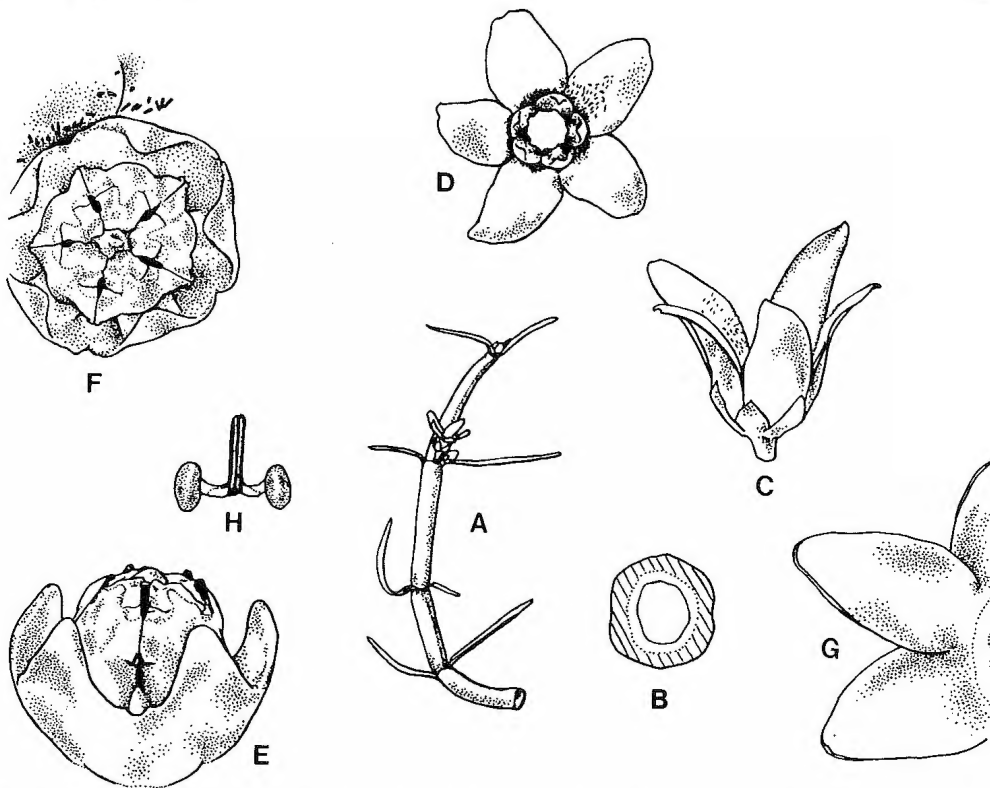


Fig. 3. *Cynanchum brachystelmoides*: A. habit $\times 1$. B. cross-section of stem showing hollow centre $\times 6$. C. side view of flower $\times 6$. D. face view of flower $\times 6$. E. side view of gynostegium $\times 18$. F. face view of gynostegium $\times 18$. G. face view of calyx with corolla removed $\times 18$. H. pollinarium $\times 37$. All from spirit material of Forster 4069 & Liddle. Del. K. Harold.

1.0 mm wide, glabrous. Flowers borne on top 1–6 nodes, in 1–7-flowered subsessile cymes. Flower campanulate, 2–4.5 mm long, 3–5 mm diameter, with a faint citrus scent; pedicels 1.5–2.5 mm long, filiform, pendulous during anthesis. Sepals broadly triangular to lanceolate, 1–1.5 mm long, 0.5–1 mm wide, glabrous; bases of sinuses lacking or with 1 gland. Corolla cream, brown or pink; tube c. 0.5 mm long, 1.5–2 mm diameter; lobes lanceolate to ovate, 1.5–4.5 mm long, 1–1.5 mm wide at base, glabrous. Staminal corona a continuous tube around the staminal column with 5 free erect lobes either overtopping the anthers, level with or below them, 1.25–1.5 mm diameter, 1–1.5 mm long; each lobe triangular, 0.25–0.75 mm long, 0.5–0.75 mm wide, green. Staminal column 0.3–1 mm long, 0.5–1.5 mm diameter; anther appendages ovate, 0.2–0.5 mm long, 0.2–0.5 mm wide; slit between anther wings 0.2–0.4 mm long. Style-head depressed-globose, not exceeding anthers, 0.4–0.75 mm diameter. Pollinarium 0.23–0.34 mm long, 0.28–0.4 mm wide; pollinia 0.14–0.15 mm long, 0.05–0.06 mm wide; corpusculum 0.20–0.27 mm long, 0.03–0.06 mm wide; caudicles 0.1–0.13 long, 0.02–0.03 mm wide. Follicles and seed not seen. Fig. 3.

Additional specimens examined: Papua New Guinea. WESTERN PROVINCE: Penzara, between Morehead and Wassi Kussa Rivers, Dec 1936, *Brass* 8448 (L). Australia. Queensland. COOK DISTRICT: 2.4 km W of Lydia Ck on the Mission River Road, 12°33'S, 142°34'E, *Clarkson* 8597 & *Neldner* (BRI,DNA,K,L,PERTH); "Batavia Downs", 12°40'S, 142°40'E, Dec 1988, *Bews* [AQ 455240] (BRI); 62.5 km along main Weipa road off Peninsula road, 12°56'S, 142°24'E, Apr 1988, *Forster* 4069 & *Liddle* (BRI,MEL).

Distribution and habitat: Western province in Papua New Guinea, Cook district in Queensland and the top end of the Northern Territory. The collection *Forster* 4069 & *Liddle* came from 30 cm deep water in a *Melaleuca* swamp. Along with *C. liebiana*, *C. brachystelmoides* appears to be able to tolerate aquatic conditions, at least for part of the year.

Additional notes: The flowering of this unusual species in cultivation has enabled a more detailed description and illustration to be published here. Considerable variation is present in the staminal corona with the tube and lobes varying in length. The coronal tube may extend to below the bottom of the anthers, as in the type and *Brass* 8396 as illustrated in Forster & Thongpukdee (1988) or it may nearly overtop them (Fig. 3E).

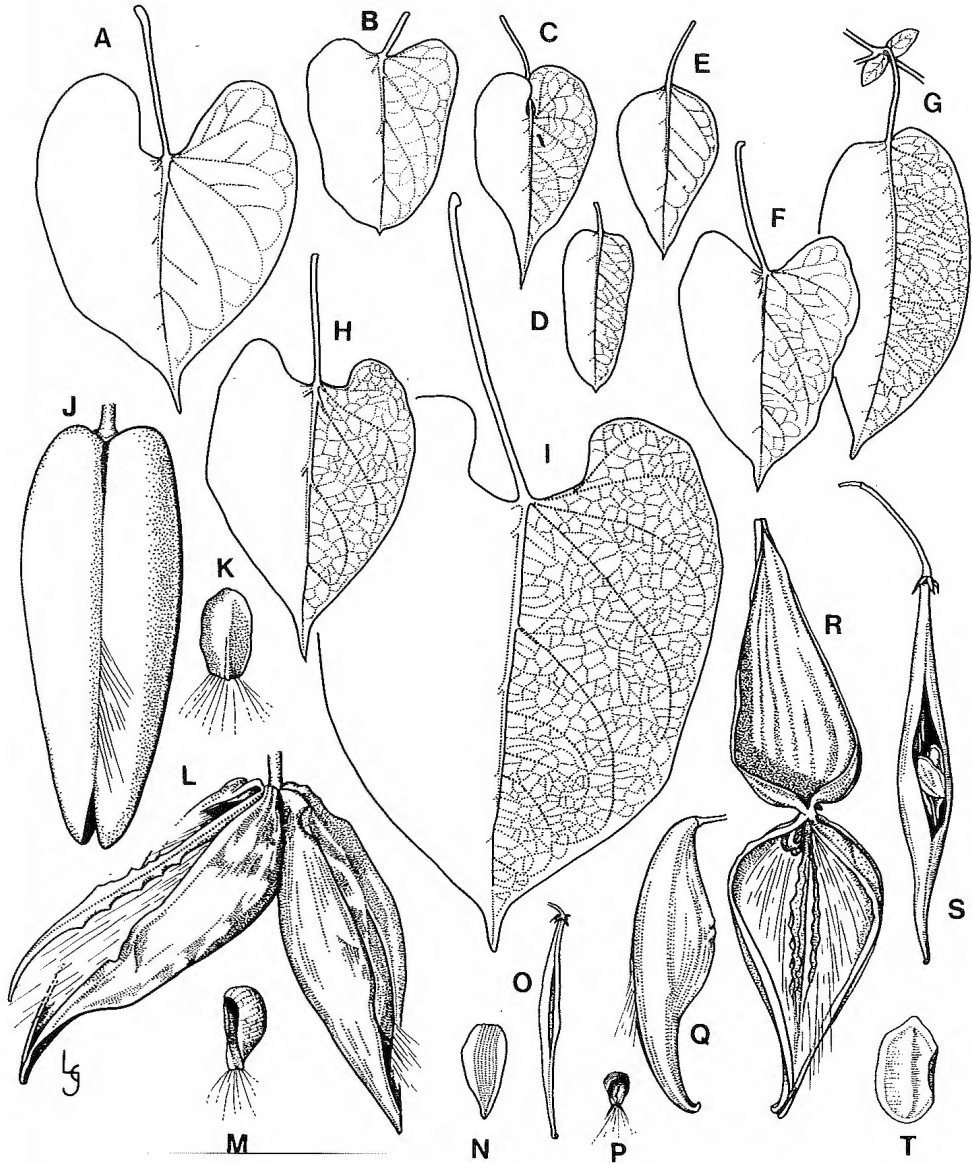


Fig. 4. A-C, L-M. *Cynanchum pedunculatum*: A. adaxial leaf surface $\times 0.5$. B. adaxial leaf surface $\times 0.5$. C. adaxial leaf surface $\times 0.5$. L. twin follicles $\times 1$. M. seed $\times 1.5$. D, J, K. *C. bowmanii*: D. adaxial leaf surface $\times 0.5$. J. follicle $\times 1$. K. seed $\times 1.5$. E. *C. elegans*: adaxial leaf surface $\times 0.5$. F, P-R. *C. puberulum*: F. adaxial leaf surface $\times 0.5$. P. seed $\times 1.5$. Q. side view of follicle $\times 1$. R. twin follicles viewed from above $\times 1$. G. *C. ovalifolium*: adaxial leaf surface $\times 0.5$. H, I. *C. leptolepis*: H. adaxial leaf surface $\times 0.5$. I. adaxial leaf surface $\times 0.5$. N, O. *C. christineae*: N. seed $\times 1.5$. O. follicle $\times 1$. S, T. *C. liebiana*: S. follicle $\times 1$. T. seed $\times 0.5$. A, Martense AE607; B, Russell-Smith 860; C, Holtze 34; D, Batianoff 9141 & Dillewaard; E, Wools [AQ 333122]; F, Mueller [AQ 333094]; G, Brass 8521; H, Russell-Smith 6924 & Lucas; I, Russell-Smith 6907; J, K Batianoff 9126 & Dillewaard; L, M Scarth-Johnson 1569A; N, O, Cox [AQ 453003]; P-R, Vernon 62; S, T, Tingey [AQ 408482]. Del. L.G. Jessup.

5. *Cynanchum christineae* P. Forster, *Austrobaileya* 3: 112 (1989). **Type:** Northern Territory, Palmerston, 12°29'S, 130°58'E, December 1987, C. Cox [AQ408484] (holo: BRI!). **Fig. 40.**

See Forster (1989) for a description and notes on distribution, habitat, phenology and conservation status.

Additional specimens: Northern Territory, 41 km past Berry Springs on Mandorah road, 12°40'S, 130°45'E, Nov 1989, Forster 6056 (BRI); 8 km along "Finnis River" road, off Bynoe road, 12°46'S, 130°46'E, Nov 1989, Forster 6060 (BRI,DNA), Tabletop Range, 90 km S Darwin, 13°12'S, 130°47'E, Nov 1988, Wightman 4637 (DNA).

6. *Cynanchum elegans* (Benth.) Domin, *Biblioth. Bot.* 89: 1085 (1928); *Vincetoxicum elegans* Benth., *Fl. austral.* 4: 330–331 (1869). **Type:** New South Wales, Ash Island, Hunter River, Miss Scott (lecto (here designated): MEL(MEL 10080!); isolecto: BRI(AQ 216451!); lectopara: New South Wales, Cabramatta, Woolls (MEL(MEL 10079!), BRI(AQ 333123!)).

Herbaceous vine, latex colour unknown. Stems cylindrical, up to 1 mm diameter, glabrous; internodes up to 7 cm long. Leaves petiolate; lamina lanceolate-ovate, up to 4.5 cm long and 3.5 cm wide, discolorous; above green, venation obscure, glabrous; below pale green, secondary veins 3 or 4 per side of midrib, glabrous; tip acuminate; base cuneate; petiole grooved along top, up to 17 mm long; extrafloral nectaries 2 or 3 at lamina base. Cymes with 1 or 2 fascicles, up to 4 cm long; peduncles to 22 mm long and c. 1 mm diameter, glabrous; bracts triangular, 0.5–0.7 mm long, 0.3–0.5 mm wide, with sparse indumentum. Flower rotate, 5–6 mm long, 6–7 mm diameter; pedicels 13–15 mm long, 0.2–0.3 mm diameter, glabrous. Sepals lanceolate, 1–1.3 mm long, 0.7–1.1 mm wide, glabrous; bases of sinuses with 1 gland. Corolla colour unknown; tube c. 1 mm long, 2–3 mm diameter; lobes lanceolate, 5–6 mm long, 1.5–2.5 mm wide, externally glabrous, internally with scattered to sparse indumentum. Staminal corona of 5 lobes, c. 2 mm long and 2 mm diameter; each lobe triangular-lanceolate, not overtopping anthers, 1–2 mm long, 1–1.3 mm wide at base. Staminal column c. 1.5 mm long and 1.5 mm diameter; anther appendages ovate, 0.3–0.5 mm long, 0.7–0.75 mm wide; slit between anther wings c. 1 mm long. Style-head conical, c. 1 mm long and 1 mm diameter. Pollinarium 0.36–0.45 mm long, 0.50–0.57 mm wide; pollinia 0.22–0.23 mm long, 0.11–0.13 mm wide; corpusculum 0.25–0.30 mm long, 0.12–0.16 mm wide; caudicles 0.10–0.15 mm long, 0.02–0.05 mm wide. Follicles and seed not seen. **Fig. 4E.**

Specimen examined: New South Wales, Berkeley Hill, Berkeley, S of Wollongong, Apr 1990, Bofeldt (BRI).

Distribution and habitat: This plant is known to occur only near Wollongong (**Map 1**). Leigh *et al.* (1984) report a further collection made by Rodd in 1966 at Mt Dangar near Gungah, but I have not seen this. The Bofeldt collection was made in a 'dry rainforest' remnant and the plant grew in association with *Sarcomelicope simplicifolia* (Endl.) T. Hartley, *Ficus macrophylla* Desf., *Streblus brunonianus* (Endl.) F. Muell. and *Cassine australis* (Vent.) Kuntze.

Phenology: Flowering in April.

Conservation status: A Conservation Coding of 3E is appropriate according to the criteria of Briggs & Leigh (1988).

7. *Cynanchum bowmanii* S.T. Blake, *Proc. Roy. Soc. Queensland* 59: 168 (1948). **Type:** as for *V. ovatum* Benth.

Vincetoxicum ovatum Benth., *Fl. austral.* 4: 330 (1869); *Cynanchum ovatum* (Benth.) Domin, *Biblioth. Bot.* 89: 1085 (1928), non (E. Mey.) Druce, *Rep. Bot. Exch. Cl. Brit. Isl.* 1916: 618 (1917). **Type:** Queensland, MORETON DISTRICT: Moggill Scrub, C. Stuart 381 (lecto (here designated): K, n.v., photo at BRI!; isolecto: MEL(MEL 113316 in part!), BRI(AQ 333121!)); lectopara: Queensland, PORT CURTIS DISTRICT: Table Mountain, Bowman (MEL(MEL 113315!), BRI(AQ 333125!)); lectopara: Queensland, MORETON DISTRICT: Brisbane River, F. Mueller (K, n.v., photo at BRI!), MEL(MEL 113316 in part!); lectopara: Queensland, PORT CURTIS DISTRICT: Rockhampton, Thozet (K, n.v., photo at BRI!).

Bailey, *Queensl. fl.* 3: 1000 (1900); Stanley & Ross, *Fl. S.E. Queensl.* 2: 312 (1986).

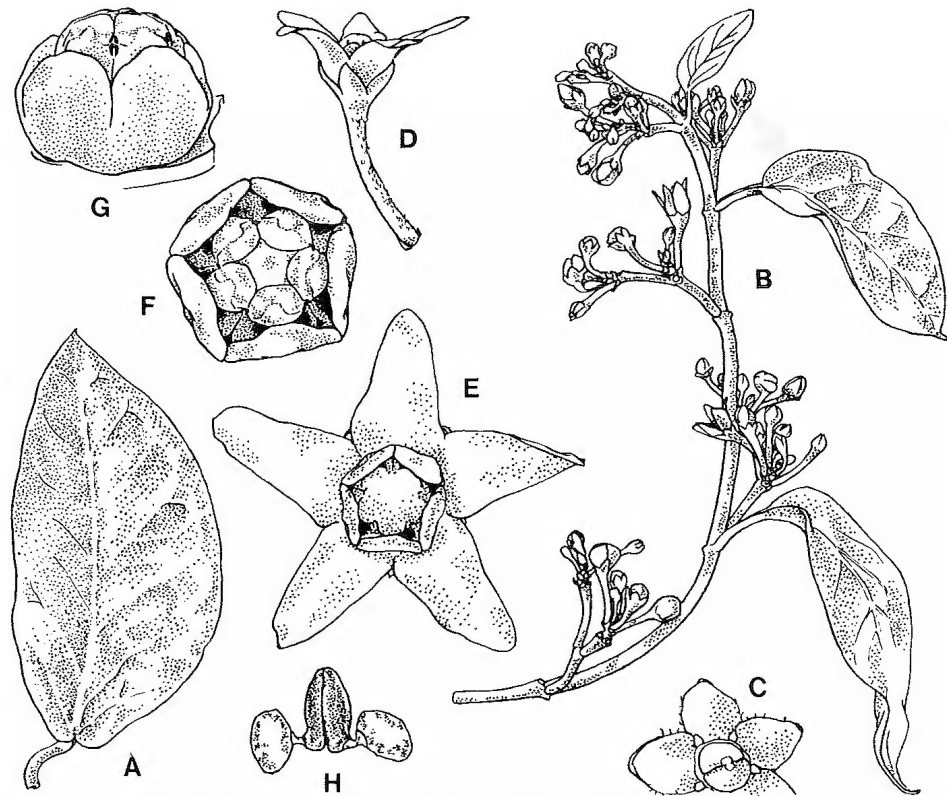


Fig. 5. *Cynanchum bowmanii*: A. leaf $\times 1$. B. habit of flowering stem $\times 1$. C. face view of calyx and ovaries with corolla removed $\times 6$. D. side view of flower $\times 3$. E. face view of flower $\times 6$. F. side view of gynostegium $\times 9$. G. side view of gynostegium $\times 9$. H. pollinarium $\times 40$. All from spirit material of Forster 2407. Del. K. Harold.

Herbaceous vine, latex white. Stems cylindrical, up to 1 mm diameter, glabrous or with sparse indumentum; internodes up to 4 cm long. Leaves petiolate; lamina lanceolate, ovate to elliptic, up to 8.5 cm long and 3 cm wide, discolorous; above green, venation obscure, glabrous; below pale green, secondary veins 6 or 7 per side of midrib, glabrous with scattered indumentum on veins; tip acute; base cuneate; petiole grooved along top, up to 15 mm long and c. 1 mm wide; extrafloral nectaries 3–4 at lamina base. Cyme with 1–6 fascicles, up to 5 cm long; peduncle 8–20 mm long, 0.5–1 mm diameter; bracts linear-lanceolate, 0.75–1.5 mm long, c. 0.5 mm wide, with sparse indumentum. Flowers rotate, 2–3 mm long, 7–8 mm diameter; pedicels 4–13 mm long, 0.5–0.75 mm diameter, with sparse indumentum. Sepals lanceolate to lanceolate-ovate, 1.5–2 mm long, 0.9–1 mm wide, glabrous; bases of sinuses lacking glands. Corolla cream; tube c. 1 mm long, 2.5–3 mm diameter; lobes lanceolate to oblong, 3–4 mm long, 1.5–2 mm wide, glabrous. Staminal corona cream, c. 1.5 mm long, 2.5–3 mm diameter, comprising 5 adjacent but not fused lobes attached to base of staminal column; each lobe with a rectangular base and with a rounded to irregularly shaped top, 1.25–1.5 mm wide. Staminal column c. 1.5 mm long, 1.5–2.5 mm diameter; anther appendages ovate, c. 0.5 mm long, 0.5–0.75 mm wide; slit between anther wings 0.5–0.75 mm long. Style-head conical, globose, barely exceeding anthers, c. 1 mm long, 1–1.5 mm diameter. Ovaries c. 1.5 mm long, 1–1.5 mm wide. Pollinarium 0.35–0.38 mm long, 0.4–0.5 mm wide; pollinia oblong to globose, 0.2–0.21 mm long, 0.12–0.16 mm wide; corpusculum oblong, 0.2–0.27 mm long, 0.08–0.12 mm wide; caudicles 0.07–0.09 mm long, 0.03–0.04 mm wide. Follicles fusiform-ovoid, 6–9.5 cm long, 1.5–2.5 cm wide. Seed ovate, c. 7 mm long and 4 mm wide; coma 20–24 mm long, white. Fig. 4D, 5 & 6.

Selected specimens. Queensland. NORTH KENNEDY DISTRICT: Rishton Scrub, 20°09'S, 146°32'E, Mar 1988, Forster 3764 (BRI, MEL, MO). SOUTH KENNEDY DISTRICT: 2 km SW Eungella Dam, Byrnes 3692 & Clarkson (BRI); Ayr, Michael 1532 (BRI); Mausoleum Is, 20°52'S, 148°57'E, Dec 1986, Dalliston N333 (BRI). PORT CURTIS DISTRICT:

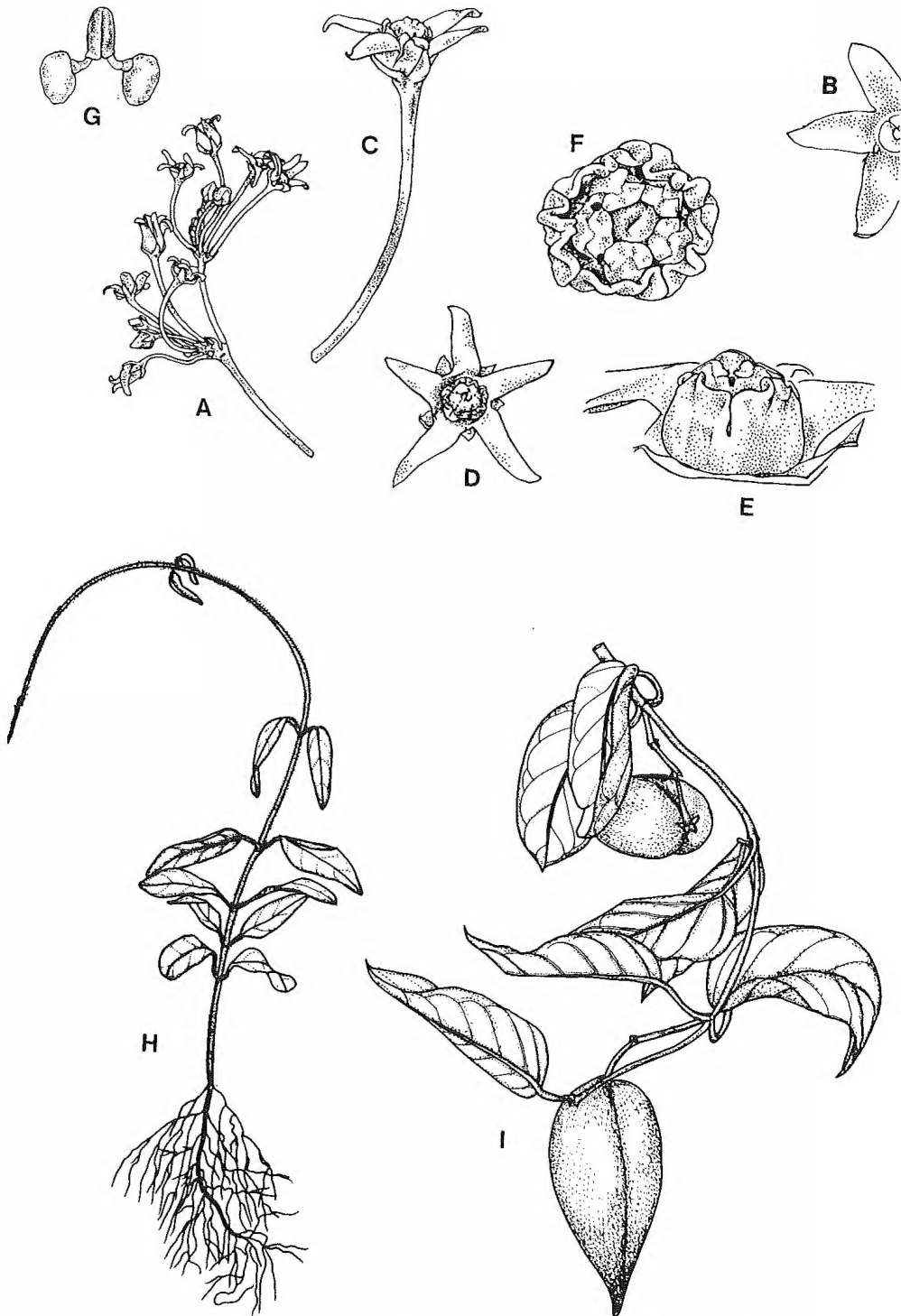


Fig. 6. *Cynanchum bowmanii*: A. inflorescence $\times 1$. B. face view of calyx and ovaries with corolla removed $\times 7$. C. side view of flower $\times 3$. D. face view of flower $\times 3$. E. side view of flower with corolla cutaway showing gynostegium (note variation in corona lobes) $\times 9$. F. face view of gynostegium (note variation in corona lobes) $\times 11$. G. pollinarium $\times 40$. H. seedling $\times 1$. I. fruiting branch $\times 2$. A-G, Forster 3764; H, Forster 3480; I, Bird s.n. Mar. 1986. A-G, Del. K. Harold; H, I. Del. A. Thongpukdee.

East Pumpkin Is, 23°05'S, 150°54'E, Oct 1987, *Batianoff* 9141 & *Dillewaard* (BRI); Dan Dan Scrub, Mar 1982, *Gibson* 333 (BRI); Marmor, Mar 1943, *Blake* 14824 (BRI). LEICHHARDT DISTRICT: Gogango Range, near Edungalba, Sep 1943, *Blake* 15340 (BRI). BURNETT DISTRICT: Boat Mt, 8 km NNE of Murgon, 26°10'S, 151°58'E May 1988, *Forster* 4266 & *Sharpe* (BRI); Mt Perry, *Keys* [AQ 216450] (BRI). WIDE BAY DISTRICT: Mt Glastonbury, 26°14'S, 152°29'E, Jan 1987, *Forster* 2872 & *Sharpe* (BRI); Stony Ck, near Didcot, Dec 1981, *Forster* 472B (BRI). DARLING DOWNS DISTRICT: 5.5 km SW of Baking Board, 26°44'S, 150°31'E, Feb 1978, *Hando* [AQ 408485] (BRI); Mt Russel, 16 miles [27 km] SW of Oakey, Apr 1963, *Hockings* 10 (BRI). MORETON DISTRICT: Worlds End Pocket, 27°31'S, 152°45'E, Aug 1983, *Forster* 1666 (BRI); Pine Mt, near Ipswich, Apr 1984, *Bird* [AQ 431091] (BRI, CONN, NSW, SP); Mt Crosby road, between Anstead & Mt Crosby, Dec 1985, *Bird* [AQ 441683] (BRI, GUAM, GNU, NSW, UPNG); Top of Flinders Peak, 27°49'S, 152°49'E, Nov 1986, *Forster* 2732 & *Orford* (BRI); Ivorys Knob, 27°53'S, 152°48'E, Dec 1987, *Bird* & *Orford* [AQ 459646] (BRI); 11 km from Croftby on White Swamp to Boonah Border Gate road, 28°10'S, 152°32'E, Feb 1985, *Forster* 1981 (BRI).

Distribution and habitat: This species occurs from near the Queensland-New South Wales border to the Charters Towers area (Map 3) and grows in a range of drier vineforest communities, especially in semi-evergreen vine thickets, deciduous vine thickets, araucarian microphyll and notophyll vineforests on a range of soil types. *C. bowmanii* may grow in association with other Asclepiadaceous vines such as *Tylophora benthamii* Tsiang, *T. grandiflora* R. Br., *T. williamsii* P. Forster ined., *Gymnema micradenium* Benth., *G. pleiadenium* F. Muell. *Secamone elliptica* R. Br., *Marsdenia rostrata* R. Br. and *M. lloydii* P. Forster.

Phenology: Flowering from November to March, fruiting 2–3 months later.

Conservation status: Not rare or endangered.

Notes: The MEL specimen of the Bowman collection has two labels, one has "Table Mountain, Feb 1867", the other has "Capricornia, Q". The sheet MEL 113316 appears to have both the Moggill Scrub and Brisbane River isosyntypes attached.

8. *Cynanchum leptolepis* (Benth.) Domin, Biblioth. Bot. 89: 1085 (1928); *Vincetoxicum leptolepis* Benth., Fl. austral. 4: 331 (1869). Type: Queensland. SOUTH KENNEDY DISTRICT: Elliot River *Bowman* 337 (lecto (here designated): K, *n.v.*, photo at BRI; isolecto: BRI(AQ 333127!), MEL(MEL 113314!)); lectopara: Queensland. SOUTH KENNEDY DISTRICT: Mount Elliot, *Fitzalan* (BRI(AQ 333129!), MEL(MEL 113313!)).
Bailey, Queensl. fl. 3: 1000 (1900).

Woody vine, latex white. Stems cylindrical, up to 2 mm diameter, with sparse to dense indumentum; internodes up to 20 cm long. Leaves petiolate; lamina ovate, up to 17 cm long and 14 cm wide, discolorous; above grey-green, venation obscure, glabrous; below pale grey-green, secondary veins 5 or 6 per side of midrib with 3 radiating from the lamina base, tertiary venation reticulate, glabrous or with sparse indumentum; tip acute to weakly acuminate; base cordate to lobate; petiole grooved along top, 4–8 cm long, 1–2 mm diameter, with sparse to dense indumentum; extrafloral nectaries 6–13 at base of lamina and sometimes for up to 1 cm along the midrib. Cyme with many fascicles, up to 8 cm long; peduncle 3.5–5.7 cm long and c. 1 mm diameter, glabrous or with scattered to sparse indumentum; bracts linear-lanceolate, 1–2.5 mm long, 0.25–0.75 mm wide with scattered to sparse indumentum. Flower campanulate, 4–5 mm long, c. 5 mm diameter; pedicels 4–7 mm long, 0.25–1 mm diameter, glabrous. Sepals triangular to lanceolate, 2–3 mm long, 0.8–1.5 mm wide, glabrous or with scattered to sparse indumentum; bases of sinuses with 1–2 glands. Corolla cream; tube 2.5–3 mm long, 2.5–3 mm wide, top fused to base of staminal corona; lobes lanceolate-ovate, reflexed, 2.1–3 mm long, 1.4–1.6 mm wide, glabrous. Staminal corona of 5 separate lobes, 3–5 mm long, 2.5–3.5 mm diameter; each lobe oblong with a subulate tip, 0.5–1 mm wide at base, 0.2–0.3 mm wide at tip, incurving over staminal column. Staminal column 1–2.7 mm long, 1.5–2.3 mm wide; anther appendages ovate, 0.5–0.75 mm long, 0.8–1 mm wide; slit between anther wings 0.5–0.6 mm long. Style-head depressed, globose, barely exceeding anthers, 0.7–1.5 mm long, 1.5–1.8 mm wide. Ovaries 1–1.1 mm long and 1–1.5 mm wide. Pollinarium 0.4–0.6 mm long, 0.65–0.72 mm wide; pollinia oblong, 0.37–0.42 mm long, 0.15–0.17 mm wide; corpusculum 0.2–0.25 mm long, 0.1–0.17 mm wide; caudicles 0.18–0.2 mm long, 0.02–0.05 mm wide. Follicles fusiform-ovoid 5–6 cm long, 12–15 mm diameter, with sparse to dense short indumentum. Seed not seen. Figs 4H, I & 7.

Specimens examined: Northern Territory, Headwaters Woolen River, Arnhem Land, 12°30'S, 135°24'E, Dec 1987, *Russell-Smith* 4410 & *Lucas* (DNA); 11 km SE Calvert River mouth, 16°21'S, 137°48'E, Jan 1989, *Thomson* 3013 (DNA); 17 km E Calvert River mouth, 16°23'S, 137°47'E, Jan 1989, *Thomson* 3005 (DNA); 15 km SE Calvert

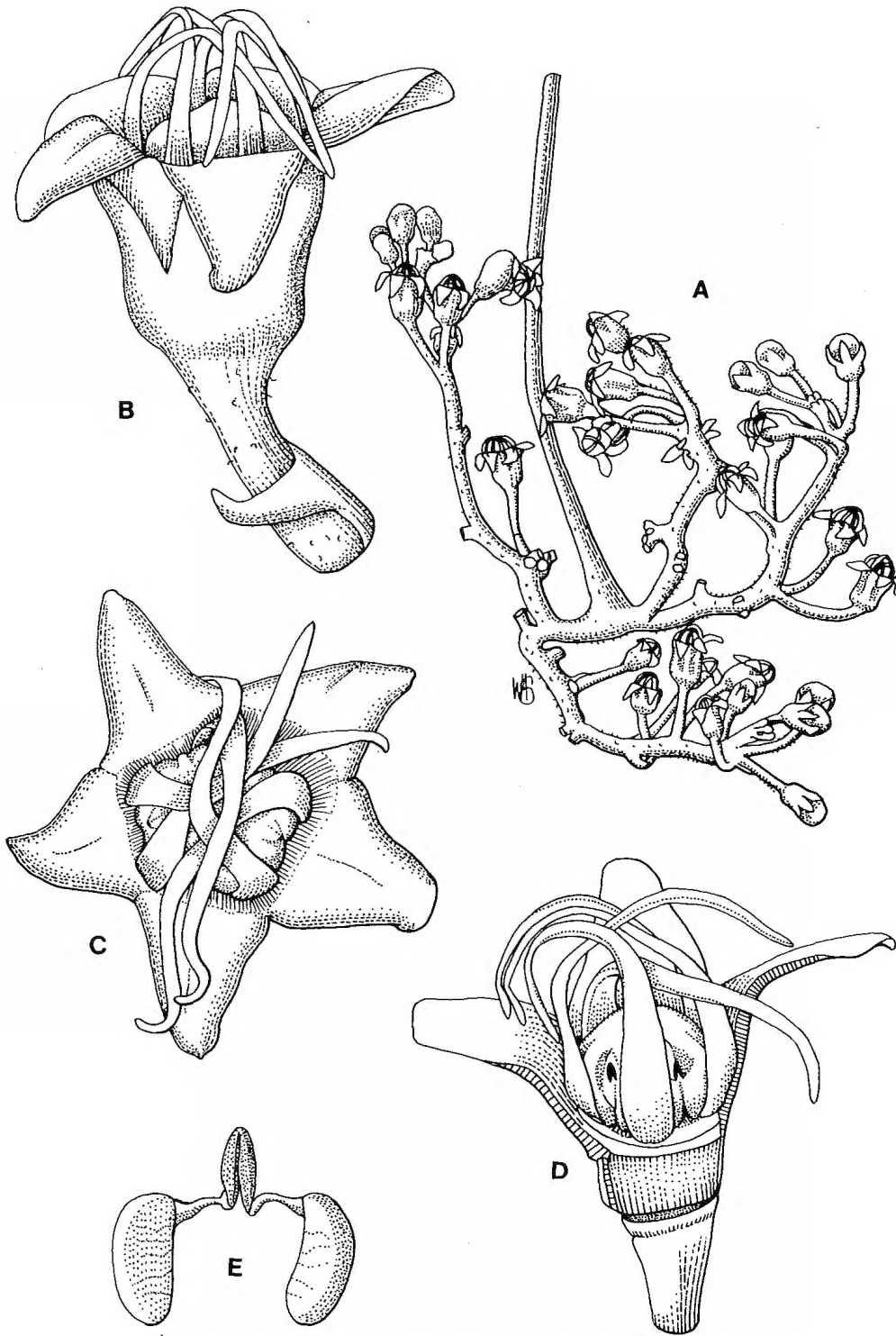


Fig. 7. *Cynanchum leptolepis*: A. inflorescence $\times 2$. B. side view of flower $\times 6$. C. face view of flower $\times 6$. D. side view of flower with corolla and sepals cutaway showing gynostegium and corona $\times 6$. E. pollinarium $\times 50$. All from spirit material of Russell-Smith & Lucas 6294. Del. W. Smith.

River mouth, 16°23'S, 137°50'E, Jan 1989, *Russell-Smith & Lucas* 6907 (DNA); 4 km S of Spear Waterhole, "Wollogorang", 17°25'S, 137°43'E, Jan 1989, *Russell-Smith & Lucas* 6849 (DNA); McDermotts Spring, "Wollogorang", 17°25'S, 137°48'E, Jan 1989, *Russell-Smith & Lucas* 6294 (BRI,CANB,DNA); "Wollogorang", c. 35 km SW HS, 17°26'S, 137°43'E, Jan 1989, *Brock* 468 (DNA). Queensland. COOK DISTRICT: Pine River Basin, 12°31'S, 141°39'E, Feb 1981, *Morton* 1086 (BRI); Walsh, Mar 1891, *Barclay-Millar* [AQ 216488] (BRI); 8.3 km S of Weipa turnoff, on Peninsula road, 13°11'S, 142°47'E, Apr 1988, *Forster* 4122 & *Liddle* (BRI); Bamboo Range, 19 km past Musgrave on Coen road, 14°38'S, 143°27'E, Jun 1989, *Forster* 5229 (BRI); Burdett Ck, next to Spring Tower, Chillagoe, 17°08'S, 144°26'E, Apr 1988, *Forster* 3962 (BRI,CANB,MEL); The Archways, Chillagoe, 17°06'S, 144°24'E, Mar 1988, *Forster* 3959 (BRI), ditto, Mar 1987, *Clarkson* 6863 (BRI,MBA); Mt Pinnacle, 17°14'S, 145°30'E, Mar 1986, *Sankowsky* 497 & *Sankowsky* (BRI). SOUTH KENNEDY DISTRICT: Port Mackay, 1865-1869, *Dietrich* 2804 (BRI,CBG).

Distribution and habitat: This species is restricted to north Queensland and eastern Arnhem Land and the Gulf of Carpentaria in the Northern Territory (Map 2) where it may be a common component of deciduous vine thickets. *C. leptolepis* may grow in association with other Asclepiadaceous vines such as *Gunnesia pepo* P. Forster, *Gymnema geminata* R. Br., *Marsdenia cymulosa* Benth., *M. velutina* R. Br., *Ceropegia cumingiana* Decne., *Secamone elliptica* and *S. lineata* Blume.

Phenology: Flowering from November to March, fruiting 2-3 months later.

Notes: Plants of *C. leptolepis* from the limestone tors at Chillagoe are notable for the thick indumentum of white hairs present on the foliage. This is common among many plants in the area and no taxonomic significance is given to it here, particularly because plants cultivated away from this environment do not retain this feature.

Conservation status: Rarely collected, but not rare or endangered at this stage.

9. *Cynanchum ovalifolium* Wight, Contrib. bot. India 57 (1838); *Cynoctonum ovalifolium* (Wight) Decne. in DC., Prodr. 8: 529 (1844). Type: India. Penang, Aug 1827, (holo: K-W(8226), n.v., fiche at BRI!).

J.D. Hook., Fl. Brit. India 4: 22-23 (1885); Bakhuizen van den Brink, Blumea 6: 369 (1950); Backer & Bakhuizen van den Brink, Fl. Java 3: 253 (1965).

Cynanchum laeve (Blume) Schumann, Nat. Pflanzenfam. 4(2): 292 (1897) non Persoon, Syn. 1: 27 (1805); *Holostemma laeve* Blume, Bijdr. 1055 (1826); *Cynoctonum blumei* Decne. in DC., Prodr. 8: 528-529 (1844). Type: Indonesia. Java. Sallak, Blume (holo: L(898166-426!)).

Koord., Exkurs.-Fl. Java 3: 85 (1912).

Cynanchum javanicum (Koord.) Bakhuizen van den Brink, Blumea 6: 369 (1950); *Marsdenia javanicum* Koord. in Koord.-Schumach., Syst. Verz. 1: 8 (1912); **synon. nov.** Type: Indonesia. Java. Besechi, Gendingwaloh, Aug 1916, *Koorders* 43102β (syn: BO n.v.; isosyn: L!); Indonesia. Java. Res. Bezoeki, Pantjoer Tdjen, Dec 1898, *Koorders* 32271β (syn: BO n.v.; isosyn: L!); Indonesia. Java. Res. Bezoeki, Pantjoer Tdjen, Nov 1895, *Koorders* 20346β (syn: BO n.v.; isosyn: L!).

Koord., Exkurs.-Fl. Java 3: 104 (1912); Backer & Bakhuizen van den Brink, Fl. Java 2: 253 (1965).

Vincetoxicum discolor Warb., Bot. Jahrb. Syst. 13: 469 (1891), **synon. nov.** Type: "Sigar am McCluersgolf, holl. Neu-Guinea" (B†).

Herbaceous vine, latex white. Stems cylindrical, up to 2 mm diameter, grey-green; internodes up to 12 cm long, small stipule like structures at nodes or occasionally leaflike stipular structures to 1 cm long at nodes. Leaves petiolate; lamina ovate-lanceolate to lanceolate, up to 12 cm long and 7 cm wide, discolorous; above dark green, venation obscure, glabrous; below pale green, secondary veins 10-13 per side of midrib, tertiary venation obscure, glabrous apart from a few white uniseriate hairs at base and along peduncle; tip acuminate; base cordate to cuneate; petiole grooved along top, 28-32 mm long, c. 1 mm diameter; extrafloral nectaries 2 at lamina base. Flowers borne on top 2-10 nodes. Cymes comprising 1-10 fascicles, up to 10 cm long; peduncle to 37 mm long, c. 1 mm diameter, with scattered to sparse indumentum, green. Flowers rotate, c. 4 mm long, 6-7 mm diameter; pedicels 4-7 mm long, c. 1 mm diameter, with scattered to sparse indumentum. Sepals ovate, c. 1.5 mm long and 1.5 mm wide, green, ciliate, externally with sparse to dense indumentum; bases of sinuses with 1 gland. Corolla tube cream, 1-1.5 mm long, c. 3 mm diameter, glabrous; lobes ovate-oblong, 4-5 mm long, 1-3 mm wide, somewhat pouched in middle, with brown-red and yellow-cream alternate striping, glabrous. Staminal corona c. 3 mm long, 4-5 mm diameter, tubular with c. 15

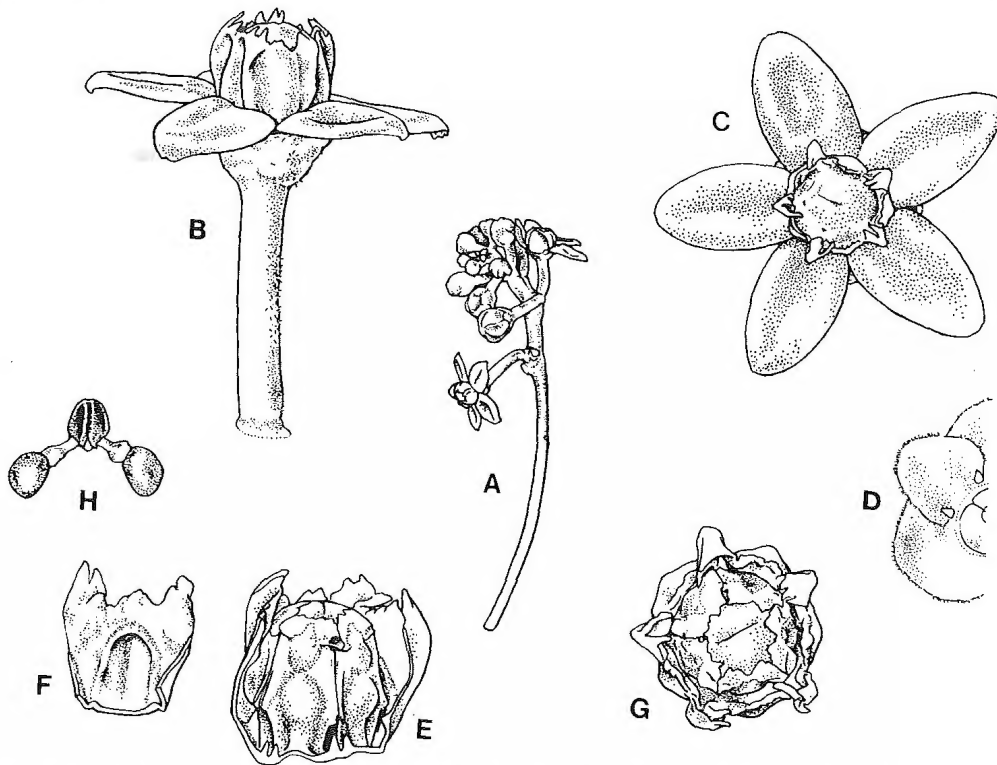


Fig. 8. *Cynanchum ovalifolium*: A. inflorescence $\times 1$. B. side view of flower $\times 4$. C. face view of flower $\times 4$. D. face view of calyx and ovaries with corolla removed $\times 6$. E. side view of gynostegium with partial removal of tubular corona $\times 6$. F. cut-away portion of tubular corona $\times 6$. G. face view of gynostegium $\times 6$. H. pollinarium $\times 18$. All from spirit material of Forster 4090 & Liddle. Del. K. Harold.

irregular lobes, tubular portion c. 2 mm long, lobes up to 1 mm long; two lobes opposite each corpusculum and 1 lobe between each pair. Staminal column c. 2.5 mm long, 2–2.5 mm diameter; anther appendages triangular to ovate-truncate, 0.6–1 mm long, c. 1 mm wide; slit between anther wings 1–1.5 mm long. Style-head conical, globose, 1–1.5 mm long, c. 2 mm diameter. Ovaries c. 2.5 mm long, 1–2 mm wide. Pollinarium 0.6–0.8 mm long, 0.8–1.1 mm wide; pollinia ellipsoid, 0.35–0.37 mm long, 0.22–0.31 mm wide; corpusculum oblong, 0.3–0.35 mm long, 0.2–0.22 mm wide; caudicles 0.17–0.27 mm long, 0.06–0.1 mm wide at end joining corpusculum, 0.16 mm wide at end joining pollinium. Follicles fusiform-ovoid, 7–8.5 cm long, 3–3.5 cm wide. Seed ovate, 6–7 mm long, c. 4 mm wide; coma 2–2.5 cm long, white. Figs 4G & 8.

Selected specimens. Indonesia. Halmahera Sosoepae Kp. Taraeba, Oct 1937, *Nedi* 210 (L); Ambon, Kampong Koeda mati, Apr 1918, *Rornassi* 1111 (L); Kiakalan. P. Rakala, Oct 1951, *van Borssum Waalkes* 914 (L). Java. G. Muria, Mt Argodjembangan, Nov 1951, *Kostermans* 6313 (L); Batavia, Buitenzorg, Pasir Honje, Jun 1928, *Bakhuizen van den Brink* 7365 (BRI). Irian Jaya, path from Pocan Bay to Fofak Bay, Waigeo Island, Feb 1955, *van Royen* 5544 & 5542 (CANB,L); Cycloop Mts, hills E of Koejaboe River, Jun 1961, *van Royen & Sleumer* 5828 (A,L). Papua New Guinea. MADANG PROVINCE: Road no. 1, near Mauan Village, Gogol Valley, 5°13'S, 145°35'E, Jan 1977, *Wiakabu et al.* LAE70370 (BRI). EAST SEPIK PROVINCE: Cape Wom International Park, c. 8 km NW of Wewak town, 3°35'S, 143°35'E, Jan 1976, *Wiakabu & Yefle* LAE70312 (A,BRI,L); Passam, 3°48'S, 148°35'E, Mar 1989, *Hawkeswood* [AQ 470255] (BRI). MOROBE PROVINCE: Morobe, Dec 1947, *Womersley* NGF2936 (BRI); Markham Point, c. 7 miles [12 km] W of Lae, Oct 1963, *Hartley* 12255 (A,CANB). WESTERN PROVINCE: Tarara, Wassi Kussa River, Dec 1936, *Brass* 8521 (BRI). MILNE BAY PROVINCE: Menapi, Cape Vogel Peninsula, Mar 1953, *Brass* 21732 (A). Australia. Queensland. COOK DISTRICT: Cape York, near Wilderness Lodge, Mar 1984, *Jacks* [AQ 437902] (BRI,JCT); near Ginger Mick's Mine, 2 km S of Punsand Bay, 10°48'S, 142°28'E, Jun 1988, *Forster* 4447 & *Liddle* (BRI,CBG,QRS); Kennedy Hill Gorge, 12°28'S, 143°16'E, Jun 1989, *Forster* 5383 (BRI); Tin Ck, 12°29'S, 143°11'E, Jun 1988, *Forster* 4592 & *Liddle* (BRI,CANB,DNA,K,L,MO); Iron Range, Jun 1948, *Brass* 19238 (A,BRI); c. 1.5 km upstream Brown Ck crossing, road to Lockhart River Mission, 12°46'S, 143°07'E, Apr 1988, *Forster* 4090 & *Liddle* (BRI,K); Chester River, 13°40'S, 143°25'E, Jul 1977, *Hyland* 9460 (BRI,QRS).

Distribution and habitat: *C. ovalifolium* occurs from the Indian subcontinent, through Malesia to New Guinea and far north Queensland in Australia. In Australia (Map 3),

this species grows in seasonally deciduous vineforest communities. *C. ovalifolium* may commonly grow in association with *Gunnessia pepo*, *Gymnema tricholepis* Schltr., *Marsdenia velutina*, *Secamone elliptica* and *S. lineata*.

Phenology: Flowering from November to February, fruiting 2–3 months later.

Notes: The original description of *Vincetoxicum discolor* Warb. applies to this taxon. Its name is placed in synonymy with *C. ovalifolium* on this basis.

Conservation status: Not rare or endangered in any way.

10. *Cynanchum puberulum* F. Muell. ex Benth., Fl. austral. 4: 333 (1869). *Vincetoxicum puberulum* (F. Muell. ex Benth.) O. Kuntze, Revis. gen. pl. 2: 425 (1891). Type: Northern Territory. Rocks, Upper Victoria River, *F. Mueller* (holo: K, 2 sheets, *n.v.*, photo at BRI!; iso: MEL(MEL 113331!),BRI!).

Herbaceous vine, latex white. Stems cylindrical, up to 2 mm diameter, with dense silver indumentum; internodes up to 18 cm long, small stipule like outgrowths at nodes, or occasionally leaflike stipular outgrowth at node. Leaves petiolate; lamina ovate-cordate, up to 11 cm long and 9 cm wide, discolorous; above grey-green, venation obscure, with sparse to dense silver indumentum; below pale grey-green, secondary veins 4–6 per side of midrib, with dense silver indumentum; tip acuminate; base strongly cordate; petiole grooved along top, 13–40 mm long, 0.05–1 mm diameter; extrafloral nectaries 6–11 at lamina base. Flowers borne on top 2–10 nodes. Cymes of 1–6 fascicles, up to 30 mm long; peduncle to 50 mm long, 1–1.5 mm diameter, with sparse indumentum; bracts linear-lanceolate, 1.5–2 mm long, 0.25–0.5 mm wide. Flower rotate, c. 10 mm long and 18 mm diameter; pedicels 3–12 mm long, 0.25–1 mm diameter, with sparse indumentum. Sepals lanceolate to lanceolate-oblong 1.5–5 mm long, 0.5–2.5 mm wide, with sparse indumentum; bases of sinuses with 1–2 glands. Corolla cream; tube c. 2 mm long and 5 mm diameter; lobes oblong-lanceolate to lanceolate, recurved, 2.5–8 mm long, 0.5–3.5 mm wide, glabrous. Staminal corona cream, tubular with 5 groups of lobes that intertwine above the style-head; tubular portion comprising 5 ovate, acute tipped lobes fused at edges, c. 2.5 mm long, 3–4 mm diameter; erect free lobes in groups of 4 or 5 (total of 20–25), linear-subulate, each lobe 3–5 mm long. Staminal column c. 3 mm long and 3 mm diameter, cream; anther appendages ovate, c. 1.5 mm long and 1.5 mm wide; slit between anther wings c. 1.5 mm long. Style-head conical, c. 1.5 mm long and 1.5 mm wide, not greatly exceeding anthers. Pollinarium c. 0.75 mm long and 1 mm wide; pollinia oblong, c. 0.5 mm long and 0.25 mm wide; corpusculum oblong, c. 0.32 mm long and 0.16 mm wide; caudicles attached to bottom of corpusculum, c. 0.20 mm long and 0.16 mm wide. Ovaries c. 3 mm long and 2.5 mm wide. Follicles fusiform-ovoid, 50–80 mm long, 20–30 mm diameter. Seed boat-shaped, papillate, 5–6 mm long, 2–4 mm wide; coma 25–40 mm white. **Figs 4P–R & 9.**

Specimens examined: Western Australia, Prince Regent River Reserve, 15°20'S, 124°56'E, Aug 1974, *Kenneally* 2168 (PERTH); Front Beach Road, Koolan Is, 16°09'S, 123°45'E, Jun 1984, *Vernon* 62 (PERTH); Tunnel Ck, Napier Range, 17°36'S, 125°08'E, Apr 1988, *Dunlop* 7756 & *Simon* (AD,BRI,CANB,DNA,MEL,NSW,PERTH); Geikie Gorge, 18°09'S, 125°41'E, Apr 1985, *Aplin, Cranfield & Wheeler* 269 (PERTH); Manning Gorge, Jun 1976, *Beaglehole* 52540 (PERTH); Road Crossing, Napier Range, May 1971, *Maconochie* 1185 (DNA,PERTH); 26 miles [43 km] N of "Nicholson", Jul 1949, *Perry* 2393 (BRI,CANB); "Ord River", Sep 1972, *Petheram* 462 (DNA). Northern Territory, Victoria River escarpment, 15°35'S, 131°06'E, Feb 1986, *Clark* 384 & *Wightman* (DNA); 3.5 km S of Keep River, 15°47'S, 129°05'E, Mar 1989, *Lucas* 7442 & *Medlicott* (DNA); Keep River N.P., 15°50'S, 129°06'E, Mar 1981, *Dunlop* 5833 (CANB,DNA,PERTH); Dennison Range, "Sturts Ck", Jul 1972, *Maconochie* 1770 (DNA); 50 km SE Billiluna, 19°45'S, 127°50'E, Nov 1980, *Done* 362 (DNA); Adam Bay, Oct 1867, [MEL 113687] (MEL).

Distribution and habitat: *C. puberulum* occurs in northern Australia in Western Australia and the Northern Territory (**Map 2**), where it grows on sandstone substrates in eucalypt woodland or on sandstone outcrops. Plants die back to the perennial rootstock during the dry season, then reshoot on the early storms of the wet season.

Phenology: Flowering from February to May, fruiting 2–3 months later.

Conservation status: Although rarely collected, this species should not be considered as rare or endangered.

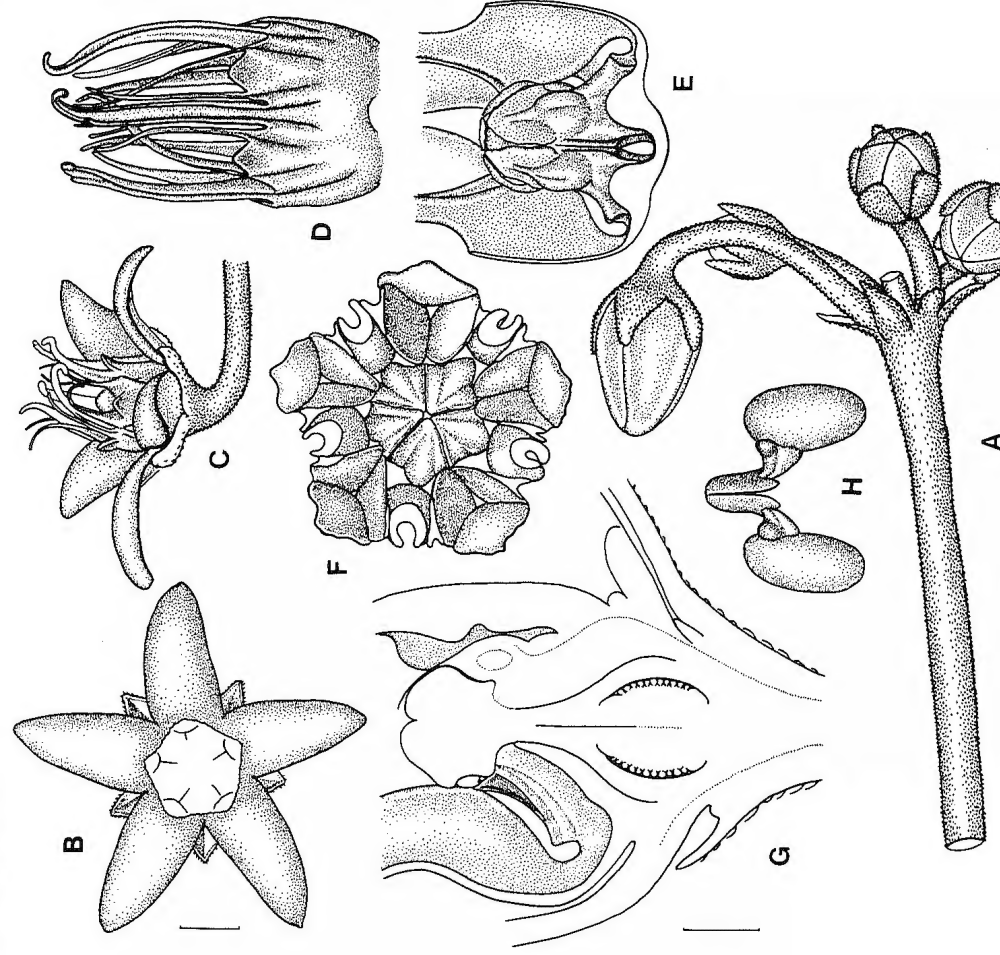


Fig. 9. *Cynanchum puberulum*: A. cyme with buds $\times 5$. B. face view of flower $\times 2.5$. C. side view of flower $\times 2.5$. D. side view of staminal column, obscuring the staminal column $\times 12.5$. E. side view of staminal column with staminal corona removed $\times 7$. F. face view of staminal column and style-head $\times 12$. G. cross-section of flower $\times 7$. H. pollinarium $\times 25$. All from spirit material of Dunlop 7756 & Simon. Del. P.V. Bruyns.

11. *Cynanchum pedunculatum* R. Br., Prodr. 463 (1810). *Cynoctonum pedunculatum* (R. Br.) Decne. in DC., Prodr. 8: 529 (1844); *Vinctoxicum pedunculatum* (R. Br.) O. Kuntze, Revis. gen. pl. 2: 424 (1891). Type: Northern Territory, Melville Bay (Arnhem North Bay), 14 February 1803, R. Brown (lecto (here designated): BM!, 2 sheets, photo at BRII).
 Benth., Fl. austral. 4: 333 (1869); Bailey, Queensl. fl. 3: 1002 (1900); Williams, Native Pl. Queensland. 3: 198–199 (1988) [as *Marsdenia microlepis*].
Cynanchum erubescens R. Br., Prodr. 463 (1810); *Cynoctonum erubescens* (R. Br.) Decne. in DC., Prodr. 8: 529 (1844); *Vinctoxicum erubescens* (R. Br.) O. Kuntze, Revis. gen. pl. 2: 424 (1891); **synon. nov. Type:** Queensland. COOK DISTRICT: Endeavour River, 1770, Banks & Solander (lecto (here designated): BM!, 2 sheets, photo at BRII).
 Sprengel, Syst. veg. 1: 851 (1820); Benth., Fl. austral. 4: 332 (1869); Bailey, Queensl. fl. 3: 1001 (1900); Britten, Illustr. Bot. Cook's Voyage 61, t.201 (1901).

Herbaceous vine, latex white. Stems cylindrical, up to 2 mm diameter, with sparse indumentum; internodes up to 15 cm long. Leaves petiolate; lamina ovate to orbicular,

up to 6 cm long and 5 cm wide, discolorous; above green, glabrous, venation obscure; below pale green, venation obscure, glabrous or with sparse indumentum, tip acute; base strongly cordate-lobate; petiole grooved along top, up to 40 mm long and 0.5 mm wide; extrafloral nectaries 8–10 at lamina base. Cymes comprising 1–5 fascicles, up to 5 cm long; peduncle to 7 cm long, and 0.5–1 mm diameter, glabrous or with sparse to dense indumentum; bracts linear-lanceolate, 0.75–6 mm long, 0.25–1.5 mm wide, with scattered indumentum. Flower rotate, 3–7 mm long, 6–10 mm diameter; pedicels 6–12 mm long, 0.5–1 mm diameter with sparse indumentum. Sepals lanceolate to ovate, 2–4 mm long, 1–2.5 mm wide, with sparse indumentum; bases of sinuses with 1–8 glands. Corolla brown, cream, pink, pale purple; tube 1–1.5 mm long, 2–4 mm diameter; lobes lanceolate to ovate, reflexed at anthesis 2–8 mm long, 1.5–3 mm wide, glabrous. Staminal corona cream, 2–3.5 mm long, 1.5–4 mm diameter, comprising a tube with 15–20 irregularly shaped lobes, each lobe 0.7–0.9 mm long. Staminal column 2–4 mm long, 1.25–2.5 mm diameter; anther appendages ovate-crenulate, 0.75–1.5 mm long, 1–1.3 mm wide; slit between anther wings 0.75–1.5 mm long. Style-head conical-globose, 0.5–1 mm long, 1–2.5 mm diameter. Ovaries 0.8–2 mm long, 0.8–1 mm wide. Pollinarium 0.5–0.8 mm long, 0.6–1 mm wide; pollinia oblong, 0.25–0.47 mm long, 0.15–0.23 mm wide; corpusculum oblong, 0.27–0.4 mm long, 0.14–0.23 mm wide; caudicles 0.13–0.2 mm long, 0.1–0.17 mm wide. Follicles often paired, ovoid, 3.5–6.5 mm long, 1.7–3 cm wide, rugose or smooth. Seed ovate, 7–8 mm long, 4–5 mm wide; coma white, 25 mm long. **Figs 4A–C, L–M & 10.**

Selected specimens: Western Australia, near old Amax Camp Site, Mitchell Plateau, 14°49'S, 125°50'E, Mar 1987, *Dunlop* 6914 & *Gallen* (DNA, PERTH); Mitchell River, 14°50'S, 125°42'E, Feb 1980, *Dunlop* 5235 (BRI, DNA, PERTH); Crystal Ck track, c. 30 km NNW of Mining Camp, Mitchell Plateau, Jan 1982, *Kenneally* 7972 (PERTH); *Kellys*

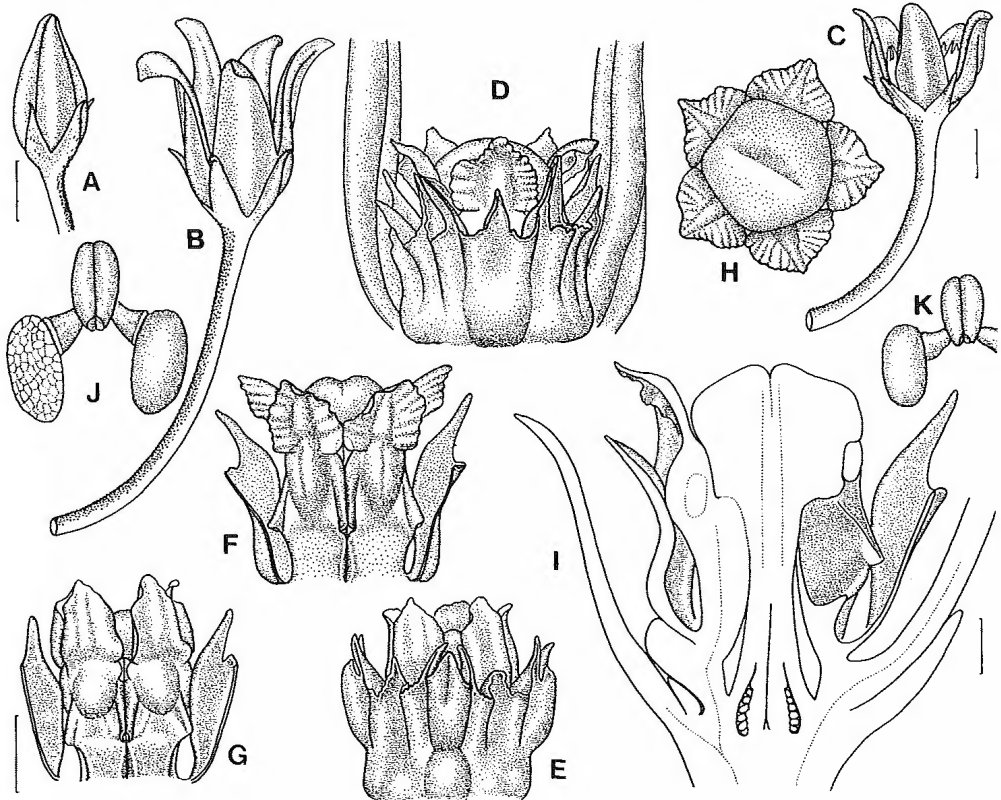


Fig. 10. *Cynanchum pedunculatum*: A. side view of bud $\times 6$. B,C. side views of flowers $\times 6$. D,E. side views of staminal coronas and staminal columns $\times 12.5$. F,G. side views of staminal coronas with staminal columns removed $\times 12.5$. H. face view of style-head and anther appendages $\times 12.5$. I. cross-section of flower $\times 12.5$. J,K. pollinarium $\times 84$. A,B, D,F, H,J from spirit material of King 18. Remainder from spirit material of Dunlop 6659. Del. P.V. Bruyns.

Knob, Kununurra, 15°46'S, 128°43'E, Nov 1981, *Dunlop* 5977 (DNA,MEL,PERTH); Keep River N.P., 15°46'S, 129°06'E, Apr 1982, *King* 102 (DNA); Junction of unnamed creek & Sale River, 30 km ESE of mouth, 16°02'S, 124°46'E, May 1986, *Kenneally* 9607 (PERTH); Gupungi road, S of Cable Beach, Broome, 17°55'S, 122°13'E, Mar 1987, *Kenneally* 9827 (DNA,PERTH); Durack Ranges, c. 62 km SE of "Bedford Downs", Jun 1975, *Symon* 10320 (AD,PERTH). Northern Territory, Darwin River Quarry, Jan 1969, *Byrnes* 1299 (DNA); behind Marlowe's Lagoon, Palmerston area, 12°29'S, 130°58'E, Dec 1987, *Tingey & Cox* [AQ 459650] (BRI); Ibangu Ck, S end of Ja Ja massif, 12°33'S, 132°55'E, Feb 1984, *Russell-Smith* 1118 (DNA); SE Mt Howship, Arnhem Land, 12°35'S, 133°10'E, Feb 1984, *Dunlop* 6659 (AD,DNA,MEL,NSW); 26 km past Mary River Crossing on Jabiru road, 12°53'S, 131°52'E, Dec 1989, *Forster* 6114 (BRI,DNA,MEL); Woolaning Saw Mill, 13°10'S, 130°40'E, Jan 1973, *Dunlop* 3141 (AD,BRI,CANB,DNA); Motor Car Ck, 13°32'S, 132°28'E, Jan 1982, *King* 18 (DNA); Angurugu, Groote Eylandt, 13°58'S, 136°27'E, Jan 1973, *Levitt* [DNA8164] (DNA); 0.25 miles [0.4 km] W of El Sharana, Jan 1973, *Martensz* AE607 (BRI,DNA); near Lake Dean, Jan 1963, *Muspratt* [DNA505] (DNA). Queensland, COOK DISTRICT: Rockingham Bay, *Dallachy* [AQ 216438] (BRI,MEL); Mt Saunders near Cooktown, Jul 1984, *Scarth-Johnson* 1569A (BRI). NORTH KENNEDY DISTRICT: Yaramulla Stn, Kilkani Cove, Apr 1980, *Williams* 80037 (BRI).

Distribution and habitat: *C. pedunculatum* is widely distributed and common in northern Western Australian and the Northern Territory, but has rarely been collected in Queensland (Map 3). This species is often associated with sandstone, limestone or granite and grows in open eucalypt forest and woodland on or near rock outcrops. The plants die back to the perennial rootstock during the dry season. When the early storms of the pre-wet season occur, the plants shoot, sending out long runners and flowering from these.

Phenology: Flowering from November to April, fruiting 2–3 months later.

Notes: *C. pedunculatum* is a very variable species and encompasses what was originally described by Robert Brown as *C. erubescens*. The type of *C. pedunculatum* has large flowers with corolla lobes longer than 6 mm and a well developed staminal corona longer than the staminal column (*King* 18 matches the type). The type of *C. erubescens* has small flowers with corolla lobes less than 4.5 mm long and a poorly developed staminal corona not exceeding the staminal column in length (*King* 102 matches the type). Small flowers tend to have small pollinaria and large flowers tend to have large pollinaria. To some extent it is possible to sort fertile material into two groups based on these few characters. However, the two entities so defined occur over the same geographic range, in the same habitat, and are indistinguishable in characters of the foliage and fruit. Furthermore, there are a number of collections that have staminal coronas of intermediate length (e.g. *Dunlop* 6659 and 3141) and there is considerable variation in size of the pollinarium and its components (Table 1). This degree of variation in flower size, staminal corona development and pollinaria occurs in other Australian species such as *C. brachystelmoides*. Species such as *C. tetrapterum* from Africa can have flowers of greatly different sizes and staminal corona development on the same plant at the same time (Forster, unpubl. data). Therefore the recognition of two taxa is unwarranted and all populations are referred to *C. pedunculatum*.

Conservation status: Not rare or endangered.

Table 1. Comparison of characters for four collections of *Cynanchum pedunculatum*

Character	Collection			
	<i>Dunlop</i> 6659	<i>Dunlop</i> 3141	<i>King</i> 102	<i>King</i> 18
flower length × diameter (mm)	4.5 × 8	5 × 10	4 × 6	7 × 7
lobe length × width (mm)	3.5 × 2	4–4.5 × 2	4 × 1.5–1.75	8 × 2.5
staminal corona length (mm) . .	2	2.5	1.5	2.5
no. lobes on corona	20	20	20	15
staminal column length (mm) . .	2	2	2	2.5
pollinarium length × width (mm)	0.70 × 0.70	0.55 × 0.80	0.80 × 1.00	0.50 × 0.70
pollinium length × width (mm)	0.37 × 0.19	0.37 × 0.20	0.30 × 0.18	0.47 × 0.23
corpusculum length × width (mm)	0.30 × 0.20	0.35 × 0.15	0.27 × 0.14	0.40 × 0.23

Excluded Species Names in *Cynanchum* and *Vincetoxicum*

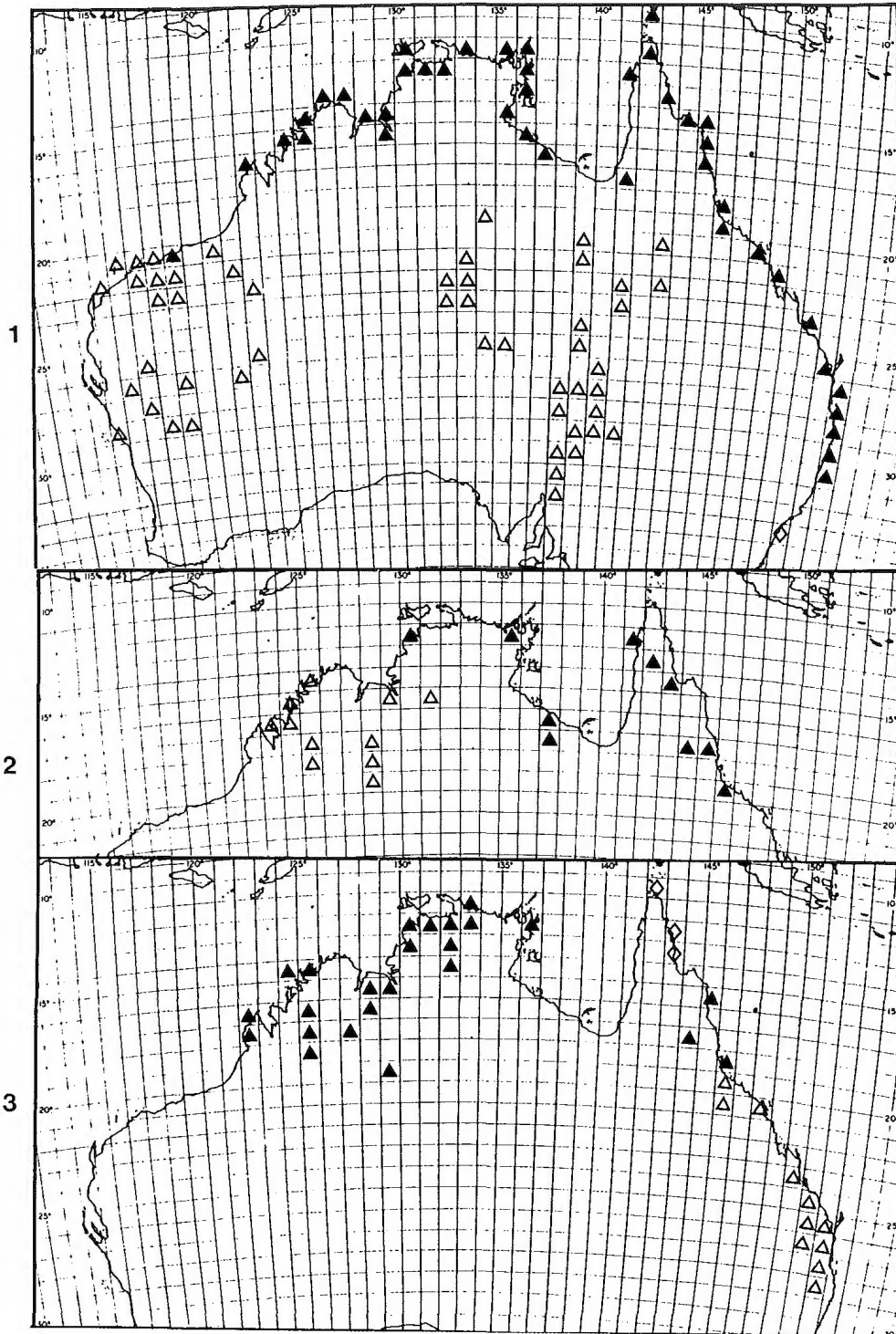
- Cynanchum neopommeranicum* Schltr., Bot. Jahrb. Syst. 50: 93 (1914), *nom. inval.*
- Cynanchum dichasiale* O. Schwarz, Fedde Repert. 24: 94 (1927). (= *Secamone elliptica* R. Br., *vide* Forster & Harold, Austrobaileya 3: 72 (1989)).
- Vincetoxicum woollsii* (Benth.) O. Kuntze, Revis. gen. pl. 2: 424 (1891). (= *Tylophora woollsii* Benth.).
- Vincetoxicum grandiflorum* (R. Br.) O. Kuntze, Revis. gen. pl. 2: 424 (1891). (= *Tylophora grandiflora* R. Br.).
- Vincetoxicum paniculatum* (R. Br.) O. Kuntze, Revis. gen. pl. 2: 425 (1891). (= *Tylophora paniculata* R. Br.).
- Vincetoxicum erectum* (F. Muell. ex Benth.) O. Kuntze, Revis. gen. pl. 2: 424 (1891). (= *Tylophora erecta* F. Muell. ex Benth.).
- Vincetoxicum polyanthum* O. Kuntze, Revis. gen. pl. 2: 424 (1891). (= *Tylophora benthamii* Tsiang).
- Vincetoxicum calcaratum* (Benth.) O. Kuntze, Revis. gen. pl. 2: 424 (1891). (= *Heterostemma acuminatum* Decne.).
- Vincetoxicum barbatum* (R. Br.) O. Kuntze, Revis. gen. pl. 2: 424 (1891). (= *Tylophora barbata* R. Br.).
- Vincetoxicum enerve* (F. Muell.) O. Kuntze, Revis. gen. pl. 2: 424 (1891). (= *Tylophora biglandulosa* (Endl.) F. Muell.).
- Vincetoxicum flexuosum* (R. Br.) O. Kuntze, Revis. gen. pl. 2: 424 (1891). (= *Tylophora flexuosa* R. Br.).
- Vincetoxicum benthamianum* O. Kuntze, Revis. gen. pl. 2: 424 (1891). (= *Tylophora erecta* F. Muell. ex Benth.).
- Vincetoxicum pachylepis* Bailey, Bot. Bull. 8: 79 (1893); *Cynanchum pachylepis* (Bailey) Domin, Biblioth. Bot. 89: 1085 (1928). (= *Marsdenia araujacea* F. Muell.).

Acknowledgments

Illustrations were prepared by P.V. Bruyns, K. Harold, L.G. Jessup, W. Smith and A. Thongpukdee. Special collections were either made by or on trips with: M.E. Ballingall, L.H. Bird, A. Bofeldt, C. Cox, G. Kenning, D.J. Liddle, M.F. Olsen, M. O'Reilly, D. Orford, J. Russell-Smith, P.R. Sharpe, J. Stobo, R. Tingey and M.C. Tucker. G.P. Guymer, J.G. West and K.L. Wilson while Australian Botanical Liaison Officers at Kew, U.K., located and photographed various types. The Directors/Curators of the cited herbaria allowed access to collections either at their institutions or on loan. The staff at DNA and QRS allowed extended use of facilities. The Australian Biological Resources Study provided funding during 1988 to 1990. All are gratefully acknowledged for this assistance.

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Maps 1-3. Distribution of *Cynanchum* spp.: 1. *C. floribundum* \triangle ; *C. carnosum* \blacktriangle ; *C. elegans* \diamond . 2. *C. puberulum* \triangle ; *C. leptolepis* \blacktriangle . 3. *C. bowmanii* \triangle ; *C. pedunculatum* \blacktriangle ; *C. ovalifolium* \diamond .

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Accepted for publication 10 December 1990